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NO. 1

ORIGINAL COMMUNICATIONS

RETRODISPLACEMENTS OF THE UTERUS FOLLOWING CONFINEMENT*

BY

AUSTIN FLINT, JR., M. D.,
New York.

In looking over the literature of retrodisplacements of the uterus following confinement, I was surprised to find how little had been written bearing directly on the subject. This is especially true as regards frequency and causation.

W. G. Gayler of St. Louis in a short paper recently published in the *Journal of the American Medical Association*, states that during the year ending last August, 105 papers were written on the subject of uterine displacements and that in only one paper was the cause of this condition taken up, leaving out of consideration obstetric injuries. Practically every paper of these 105 mentioned injuries as a causative factor, but ignored other causes.

In the text-books on obstetrics very little is said about retrodisplacements. Too early getting up and the dorsal posture are mentioned as causes but rather indefinitely. To quote three of four instances seems to me to be instructive.

Thus Hirst, in his text-book, recommends a routine examination between the third and fourth week postpartum. "If the uterus is found retroflexed at this time the patient is instructed to assume the knee-chest posture twice a day." He has found the postural treatment of displacement permanently successful in a considerable proportion of cases. He also states that premature getting up is one of the prominent causes of retroversions of the uterus.

* Read at a meeting of the New York Obstetrical Society, April 14, 1914.

Williams advises an examination at the end of the third or at the beginning of the fourth week. He states that "Not infrequently the uterus will be found displaced, when the introduction of a properly fitting pessary may lead to a prompt cure. If the uterus is displaced it should be put in proper position by bimanual manipulation and held in position by a suitable pessary. So long as the body of the uterus lies above the superior strait displacement cannot occur as the falling backward of the enlarged fundus is prevented by the promontory of the sacrum. As soon as the organ has descended into the pelvic cavity a retroflexion or retroversion becomes possible. As a cause, he speaks of excessive relaxation of the structures about the base of the broad ligaments apparently due to overdistention by the presenting part and by no means always due to traumata incident to operative procedure. "It frequently follows normal spontaneous labors during which no apparent injury was sustained. It is possibly favored by the use of the abdominal binder, may merely represent a recurrence of a similar condition existing prior to pregnancy, and, occasionally, may be the result of extreme distention of the bladder."

Edgar says: "The patient should retain the recumbent position in bed until the uterus can no longer be felt by external palpation; that is, ten days or two weeks. The practice of keeping the patient on her back for all this period is not to be recommended. It tends to cause posterior displacement of the uterus. After the first seventy-two hours the patient should be encouraged to turn, first on one side and then on the other, and later to lie upon the abdomen, and finally to sleep in this position. Getting up too soon, and especially too early resumption of household duties, are important factors in the production of displacements. Retroflexion and retroversion are most commonly found in women who have suffered from these displacements before conception and in those who have aborted. A sudden strain, failure to empty the bladder when the desire is felt, and the use of tight binders, as noted before, may all contribute to these forms of displacement. These patients should stay in bed longer than usual and they should lie on the side as much as possible. Patients should assume the exaggerated lateral prone position for several short periods each day. A suitable pessary should also be placed in position."

De Lee says: "The patient is instructed to appear for examination eight weeks after delivery. If the uterus is retroverted it is to be replaced and a pessary inserted."

Davis states, that "Care should be taken that a patient is not

allowed to lie continuously on the back during the puerperal period. After the first few days the mother should turn upon her side frequently as the uterus descends into the pelvis she should turn partially upon the abdomen. If the tendency to retroversion is discovered, the mother should assume the knee-chest posture several times daily. If the knee-chest position is not sufficient the pessary should be used."

These somewhat extensive quotations comprise nearly all that can readily be found about a condition that is admittedly frequent and serious in that, if neglected, it leads to permanent invalidism.

The subject may be taken up from the standpoint, first, of frequency, second, cause, third, prevention, and fourth, treatment and results.

Frequency.—I have been able to find only one instance where statistics have been given in regard to frequency. K. Mayer quoted in the "Year Book of Obstetrics," for 1910 (edited by De Lee), found twelve retroversions in 300 cases, and eight in another series of 416 cases. I have looked over the records of my private patients where conditions were of the best, and examinations made several times during the puerperium. In 131 of these cases retroversion was found twenty-one times, a little over 16 per cent. Dr. Frederick W. Rice has looked over the records of my services at the Manhattan Maternity Hospital and at Bellevue Hospital, including the service at the Midwifery School. Records were kept only during the time that patients were still in the hospitals, so that it was impossible to obtain from the regular hospital records the number of cases in which retroversion occurred. However, during the past three months cards were sent to a large number of patients who were six weeks postpartum or less, asking them to report at the hospital for examination. One hundred and forty patients reported at the hospital, were examined, a study made of their condition at the time of examination and then a comparison was made with their condition at the time of discharge from the hospital.

Retroversion was found thirty-seven times in the 140 cases examined, or a percentage of 26.4. It is possible that this percentage is higher than the actual percentage in a consecutive number of confinement cases because, roughly speaking, only about one-third of those asked to report returned for the examination. It is probable that a large number did not return because they were feeling well, and of these a larger proportion than shown probably had no displacement.

Taking hospital and private practice figures together, observations

were made on 272 patients, and retroversion was found fifty-eight times, or a percentage of 21.3. I believe that these figures represent very closely the actual proportion of retroversions that may be expected after confinement, unless special measures are taken to prevent its occurrence.

Causes.—In a paper of this kind it is impossible to describe all the conditions which might cause retroversions. A great variety of causes are put down in text-books on gynecology which are operative after delivery as well as in the unimpregnated condition. The important facts from the standpoint of causation are these: The uterus after delivery is not only large and heavy, but is more freely movable than at any other time during the life of the woman. Bumm (quoted by Gayler) says: "The movability of the uterus and vagina during the puerperium is tremendous. It can happen that the fundus is pushed up to and under the border of the ribs when the bladder is greatly distended. The supports of the uterus are enormously relaxed after delivery." Ohlshausen (*Zentralb. f. Gynak.*, Bd. 32., No. 1), in commenting on the frequency of retroflexions after labor in primiparæ and trying to explain it, says: "In the first pregnancy the head enters the pelvis some weeks before the onset of labor. As a result of pressure the uterine and vaginal walls are greatly thinned. This thinning may be so marked that it is possible to palpate the fetal sutures through the cervix with ease. The thinning of the cervical wall is the main cause of retroflexion in the first puerperium, as the conditions do not recur in the succeeding pregnancies. Of the thirty-seven cases occurring in hospital practice, which are studied in this paper, twenty-five were primiparæ and nine of these had no apparent laceration. Retroversion after labor has always seemed to me to be an accidental occurrence, that is, a heavy uterus, freely movable in the pelvis may be turned over backward or may remain forward, according to a variety of circumstances.

The following case taken from the series of twenty-one in my private practice illustrates a cause that is probably as frequent as any other:

Mrs. X had a normal labor and a normal puerperium. I examined her at the beginning of the fourth week and found the uterus of the average size and in excellent position. The following morning she had rather a constipated movement and afterward some pain which she ascribed to hemorrhoids. She asked me to call to see her which I did, and an examination made at this time, within twenty-four hours of the previous examination, showed the uterus to be retroverted. It was replaced without any difficulty and although no pessary or tampons were used to hold the uterus in position, there

was no recurrence of the displacement. In another patient the uterus was found in normal position at the sixth week and retroverted at the eighth without any ascribable cause other than constipation. A pessary worn for about two months permanently corrected the displacement, which did not recur after a subsequent confinement. A slowly involuting, or a subinvolved uterus, abnormally movable after confinement and often associated with lacerations, is the condition which causes retroversion. A study of the causes of retroversion after confinement, therefore, resolves itself mainly into a study of the causes of subinvolution.

Influence of Lacerations.—Lacerations of the perineum and of the cervix undoubtedly delay involution, not only of the uterus but of the vagina and thus is an indirect and frequent cause of displacements. From a mechanical standpoint I believe that it is not a very frequent cause. As evidence of this all lacerations were immediately repaired after labor. A comparison of the frequency of lacerations in the retroversion cases with the frequency of lacerations in the cases where there was no retroversion is interesting and striking.

Retroversion Cases.—Of the twenty-five primiparæ in the table, lacerations of the perineum occurred sixteen times, a frequency of 64 per cent., and in the whole number of thirty-seven cases, lacerations of the perineum occurred twenty-six times, or a frequency of 73 per cent.

Normal Cases.—In 100 cases in which there was no retroversion there were seventy-eight primiparæ and twenty-two multiparæ. Of the seventy-eight primiparæ, lacerations of the perineum occurred twelve times, a frequency of 15+ per cent.; of the twenty-two multiparæ, lacerations occurred fourteen times, a frequency of 63+ per cent. Twelve primiparæ, out of a total of twenty-five had a laceration of the cervix marked enough to note on the history, a frequency of 48 per cent. In the seventy-eight primiparæ who did not have retroversion, laceration of the cervix occurred only fourteen times, a frequency of approximately 18 per cent.

To my mind these figures, as bearing on the causation of displacements following confinements, are most important.

An interesting fact in this connection is that there was one patient among the 140 examined who had a complete tear through the sphincter. In this case there was no displacement of the uterus.

Irrespective of the question of laceration, and best explained by imperfect involution, is the fact that fifteen primiparæ of the twenty-five had a good position of the uterus when discharged

from the hospital and a retroversion before the second month, and six had a retroverted uterus when discharged about the twelfth day and good position when examined six or eight weeks later.

Other Causes.—There is no doubt that the dorsal posture is a frequent contributing cause after the tenth or twelfth day, provided there is subinvolution and a relaxation of the supports. The same may be said about the binder, and tight clothing, overdistention of the bladder, straining at stool and too early getting up. I shall take up these points under the next heading.

Prevention.—The most important measure in the prevention of backward displacement of the uterus is to use what means we can to favor rapid and complete involution. In normal cases the uterus should be small enough to sink into the pelvis by the tenth or twelfth day. After this time its further involution is favored by a daily vaginal douche given as hot as the patient can comfortably bear. This should be done as a routine measure. Bimanual examinations should be made from the second week on, every four or five days. If involution is not progressive and regular and the uterus is found to be large and flabby the case is no longer considered normal, and the patient should be given ergot, or a combination of ergotin, quinine and strychnine three times a day, in addition to the douches. After the third week tampons of tannic acid and glycerine should also be used. The effect of this on a flabby, subinvolted uterus is a remarkably prompt and pronounced diminution in size. It is, of course, not necessary or wise to use tampons except in cases where the douche and the ergot treatment do not have the desired effect. As an additional measure to favor prompt involution, nursing the child at least for the first six weeks or two months should be strongly advised. The importance of immediate repair of lacerations has been spoken of. The avoidance of lacerations is enormously important. Next in importance to the management of slow involution as a means of prevention of displacement is posture. I now have all my cases assume the knee-chest position for five minutes twice a day, beginning on about the twelfth day or as soon after the tenth day as the uterus sinks down in the pelvis and the lochia ceases. Before this patients are encouraged to turn on the side and to lie or sleep on the abdomen. This postural preventive treatment should be carried out as a routine measure. I favor the limited use of the binder. Up to the tenth or twelfth day it is impossible to force the uterus backward by its use and after that time the binder is not necessary. Patients are certainly more comfortable who use

the binder and they can turn or sleep on the side more easily. After the uterus has descended into the pelvis a very tight binder may be harmful and certainly is useless, especially from the standpoint of the patient, who has been taught to think that it restores her figure. By crowding the intestines down into the pelvis in front of the uterus a tight binder may produce a backward displacement. It should therefore be discontinued or applied loosely after that time.

As a matter of routine the nurse should see that the patient passes urine regularly and does not allow the bladder to become over-distended.

Constipation is really a very troublesome problem, and the danger of producing a displacement by straining at stool is real one. Cathartics, particularly the use of mineral oil, which cannot be absorbed and so affect the milk, and simple enemata should be given as required.

Finally, the question of getting up must be considered. Too early getting up, especially when it means the resumption of household duties, is a tremendous factor in causing the arrest of involution and so producing displacement. The ordinary rules as laid down in all text-books fully cover this part of the subject. The fad of getting postpartum patients out of bed in two or three days has now been abandoned.

Treatment and Results.—The treatment and results vary somewhat according to conditions and depend largely upon the time after delivery that the displacement occurs. If it should occur between the second and third week postpartum, the treatment consists of hot douches, the internal administration of ergot, and the knee-chest posture, exactly as has been outlined under the head of prevention. Between the end of the third week and the end of the sixth week, in addition to these measures, tampons of glycerotannin should be used every third or fourth day. They should be put in either after first replacing the uterus or with the patient in the knee-chest position, and serve not only to hold the uterus forward but to reduce it in size. I know of nothing that can take the place of tampons in stimulating rapid involution. The tampons may be used without jeopardizing the end results of operations for the repair of the perineum. Before the end of the sixth week the use of a pessary is contra-indicated. After this time a pessary should be used when retroversion is present. In favorable cases the uterus will remain forward, become firm and small and the patient is cured. Should the displacement recur and the uterus still remain larger than normal, a round elastic ring pessary will hold it up comfortably and will still permit

the use of douches. In three or four weeks it should be changed to the ordinary hard rubber retroversion pessary. The vagina and perineum by this time will have decidedly more tone, lacerations will have healed and the fitting of this form of pessary becomes a simple matter.

During the time that a pessary is worn, the patient should assume the knee-chest position for five minutes twice a day. She should also take a douche once a day, attention should be given to her diet, her bowels carefully regulated and the amount of exercise or exertion she is allowed to take carefully supervised.

I cannot give the results of this treatment in the series of hospital cases. I think it is worth while to draw attention to the fact that in six cases as shown by the chart, the displacement disappeared after the patients went home, with no other treatment than douches.

In the series of private cases, there were twenty-one retroversions in all, some of which occurred more than once in the same patient. With the exception of three patients, the result in every case was a perfect cure. The history of these three patients is as follows:

The first patient has had four children. In her first confinement she was taken care of by another obstetrician. The labor was normal, followed by retroversion for which she wore a pessary, but the retroversion persisted. Following each of her next three confinements, in which she was under my care, she had retroversion and each time an unsuccessful attempt was made to hold the uterus up. It was simply a case of the recurrence of a displacement, which probably existed before her first pregnancy.

The second patient has had two children. Her first labor was prolonged, followed by a moderate postpartum hemorrhage and a slight perineal laceration which was immediately repaired. Retroversion occurred, which could not be cured by a pessary although it was worn intermittently for more than a year. Whenever the pessary was removed the uterus fell over backward. She subsequently became pregnant again and her second labor was followed by the same history. This was also a case of recurrence. Neither of these patients could be induced to submit to an operation.

The third patient has a more interesting history. She was delivered first on January 29, 1906. The labor was prolonged and the patient was exhausted, but was finally delivered without forceps. A slight perineal laceration was immediately repaired. There was no temperature during the puerperium. When I tried to replace the uterus about three weeks after delivery, I found that it was impossible to do so. For several weeks I used tampons regularly, trying from time to time to push the uterus up. She finally went to the country for the summer with her uterus backward and apparently adherent to the rectum. She was in fairly good health until early in January, 1910, when she came into the office between two and three

months pregnant. An effort was again made to place the uterus, and failing to do so an operation was advised.

On January 18, 1910, I opened the abdomen, broke up some adhesions and replaced the uterus. At the same time I shortened the round ligaments by Gilliam's method. She made an uneventful recovery without any symptoms of threatened abortion. The following August she had a normal labor, apparently not modified by the shortening of the ligaments, and a normal puerperium. I have examined her twice since then and found that the uterus remained in excellent position. Her general health has also markedly improved. As far as I know, this was the first Gilliam operation performed during pregnancy.

To summarize the chief points in what I have presented:

Retroversion after confinement occurs much more frequently than is generally supposed. It can often be prevented by simple routine measures. I have not had enough cases since adopting some of these measures to quote figures but am sure that the number is decidedly less. (I should say that I now see about one-half as many as I formerly did.)

Patients should be examined more frequently during the puerperium, and hospital patients should be instructed to return for an examination in about a month after their discharge. I have already adopted this rule in the service at the Manhattan and at Bellevue.

When retroversion does occur, treatment should be begun at once. The results of treatment which is begun early, while the uterus, including its ligaments, the vagina and pelvic floor, are still subinvolved, may be said to be universally good if we leave out cases in which the retroversion is simply a recurrence of a condition existing previous to pregnancy.

68 WEST FIFTY-FIFTH STREET.

Para	Days in bed	Perineum			Cervix		Uterus	
		Nursed	At labor	P.P.	Condition at 6 to 8 weeks	Labor	Position of uterus at discharge, average 12th day	Position of uterus at examination average 6 to 8 weeks
1	10	Yes	1st deg.	O.K.	Firm	Deep right	Anteflexed	Retroflexed
1	10	Yes	2nd deg.	Relaxed	Firm	Unilateral	Anteflexed	Retroversion
1	10	Yes	2nd deg.			Bilateral	Anteflexed	Retroversion
1	10	Yes	2nd deg.	O.K.		O.K.	Anteflexed	Retroversion
1	10	Yes	2nd deg.			Stellate	Anteflexed	Retroverted (bloody discharge)
1	10	Yes	1st deg.			Stellate	Anteflexed	Retroverted (forceps)
1	10	Yes	1st deg.			Bilateral	Anteflexed	Retroflexed
1	10	Yes				Bilateral	Anteflexed	Retroversion (prolapse)
1	10	Yes	3rd deg.		Relax { cyst. rect.	Bilateral	Anteflexed	Retroverted
1	20	No	2nd deg.		Relax { cyst. rect.	Deep lateral	Retroverted	Retroverted (prolapse)
1	12	Yes	2nd deg.				Retroverted	Retroverted (prolapse)
1	12	Yes	1st deg.				Retroverted	Retroverted
1	12	Yes	1st deg.	Relaxed	Relaxed		Retroverted	Retroverted
1	10	Yes	O.K.				Retroverted	Retroverted
1	12	Yes	2nd deg.			Left lateral	Retroverted	Retroverted prolapse
1	10	Yes	2nd deg.		Relaxed		Retroverted	Retroverted
1	10	Yes					Retroverted	Retroverted (fixed)
1	14	Yes					Retroverted	Retroverted prolapse (forceps)
1	14	Yes	2nd deg.			Lacerated	Retroverted	Retroverted
1	14	Yes	2nd deg.			Bilateral	Retroverted	Retroverted prolapse
1	10	Yes	1st deg.		Relax { cyst. rect.		Retroverted	Retroverted prolapse
2	10	Yes			Relaxed		Retroverted	Retroverted prolapse
2	12	Yes	Old			Old	Retroverted	Retroverted prolapse
2	10	Yes	2nd deg.			Deep bilateral	Retroverted	Retroverted (sm. cyst and rect.)
2	10	Yes				Lacerated	Anteflexed	Prolapsed
2	10	Yes	2nd deg.	Relaxed	Relaxed	Deep bilateral	Anteflexed	Retroverted
2	10	No	Relaxed		Relaxed	Old	Anteflexed	Retroverted
3	10	Yes	Old		Relaxed	Old	Anteflexed	Retroverted and adherent
4	6	No	Old		Relaxed	Old	Anteflexed	Retroverted
4	4	Yes	Old		Relaxed	Old	Anteflexed	Retroverted (fixed)
5	14	Yes	Old		Relaxed	Old	Retroverted	Retroverted
6	14	Yes	Old		Relaxed	Old	Retroverted	Retroverted prolapse
12	10	Yes	Old			Old	Retroverted	Retroverted prolapse

RETROVERSIONS

Position of uterus at discharge average twelfth day.	Position of uterus at examination at six or eight weeks.
1. Retroverted.	Retroverted.
2. Retroverted.	Retroverted.
3. Retroverted.	Retroverted.
4. Retroverted.	Retroverted.
5. Retroverted.	Retroverted.
6. Retroverted.	Retroverted.
7. Retroverted.	Good.
8. Retroverted.	Good.
9. Retroverted.	Good.
10. Retroverted.	Good.
11. Retroverted.	Good.
12. Retroverted.	Good.
13. Good.	Retroverted.
14. Good.	Retroverted.
15. Good.	Retroverted.
16. Good.	Retroverted.
17. Good.	Retroverted.
18. Good.	Retroverted.
19. Good.	Retroverted.
20. Good.	Retroverted.
21. Good.	Retroverted.
22. Good.	Retroverted.
23. Good.	Retroverted.
24. Good.	Retroverted.
25. Good.	Retroverted.
26. Good.	Retroverted.
27. Good.	Retroverted.
28. Good.	Retroverted.
29. Good.	Retroverted.
30. Good.	Retroverted.
31. Good.	Retroverted.

COMPLETE STERILIZATION OF THE SKIN BY IODINE.

BY

J. WESLEY BOVÉE, M. D.,

Washington, D. C.

IN my paper read before this society at its meeting in 1911, practical skin surface sterilization by painting it at a few minutes' interval, with two coats of 3 1/2 per cent. of iodine crystals in 95 per cent. alcohol was attained. That weaker solutions of iodine were unreliable for this purpose was also contended therein. Extension of the field of application of this remedy to the endometrium, Fallopian tubes and peritoneum has been made in my practical work since 1911. Since then others have made bacteriological investigations of the subject with findings, some confirming and others tending to disprove mine. Robb (*Surg., Gyn. and Obstet.*, 1913, xvii, 324) has decided from his bacteriological work (*loc. cit.*, p. 327) that "sterilization with tincture of iodine is not to be relied upon, and should be used only when more elaborate forms of sterilization are contraindicated." He states he has never employed it in his surgical work. This dictum may be said to have fallen on sterile soil as iodine sterilization is to-day the usual method and is notable in such large clinics as those of the Mayos and Crile, the latter of whom works in the same institution with Robb. I dare say the practical employment of this method during the past four years has gained for it such preference that the time for its abandonment is not near.

Your attention may reasonably be asked to the element of technical errors in bacteriological work in the way of contamination. Possibly it may offer a reason for the marked disparity in the bacteriological findings already mentioned. Lacking in bacteriological skill, I did not attempt that portion of the work but contented myself with applying the iodine and procuring the material for skillful bacteriologists. In my investigations previous to last year the late Dr. John S. Neate, microscopist to the Army Medical Museum, did the bacteriological work. He was very skillful, having been a trusted associate of the late Walter Reed before, during and after the work of the Yellow Fever Board in Cuba, and when doing this work was actively engaged in studying iodine as a germicide for the army medical corps, and particularly as a part of the first-aid package.

Last year hospital interns, well trained in bacteriology, did the work for me in the investigations made to determine, by removal of the iodine before scrapings were made, whether bacterial growth was inhibited or destroyed. These experiments will be recited below. The bacteriological work done in the experiments this year to determine whether the whole thickness of the skin was sterile after the iodine method of preparation, was done in the laboratory of the George Washington University by Dr. J. B. Briggs, Professor of Bacteriology and Pathology. In ten instances between May 9, and June 17, 1913, scrapings were made from skin prepared by the alcoholic solution of iodine mentioned (3 1/2 per cent.) and then subjected to thorough scrubbing with a strong sterile solution of hyposulphite of soda until the iodine color was gone, the patients being anesthetized at the time for operation. The technic and findings were as follows:

The following four specimens were used in the test in each of the ten cases: (1) A small amount of the solution of the hyposulphite was put in a bouillon tube as a control; (2) skin scrapings two minutes after the application of the second coat of iodine were put in some bouillon in tubes; (3) same as 2, except scrapings were made five minutes after the second painting; (4) skin scrapings from the same field after thorough washing, scrubbing and decolorizing by the sterile hyposulphite solution.

Results.—At the end of five days' incubation the forty specimens from the ten patients showed absolutely no growth.

In attempting to determine whether perfect sterilization of the skin could be produced by the painting with iodine the following technic was used in preparing the specimens for the bacteriologist. The skin was lightly painted twice (the patient being anesthetized for operation) with the iodine preparation and a strip of skin 4 in. \times 1/2 to 1 inch was cut from the median line of the abdomen, two minutes after the last coat was applied. This strip was at once dropped into a container in which was 1 quart of normal salt solution. Some of the same solution was previously put into a bouillon tube as a check. The tube and large container were taken to the laboratory and turned over to Dr. Briggs. In case 1, the iodine was of 10 per cent. strength, but in all of the other eleven it was the same as I have for four years used in surgical operations, 3 1/2 per cent. The interim between the coats varied from sixteen minutes to ninety-two minutes and the number of experiments was twelve. In the last five a vigorous culture of bacillus subtilis was rubbed into the skin to be removed thirteen to eighteen hours before its removal

and the area covered with a sterile dressing until the first coat of iodine was applied. These specimens were all transported a mile and not particularly well wrapped which may in a measure account for the contamination of the control solution in cases 5, 6 and 12 noted in Dr. Briggs' report which is here given. I am deeply obligated to Dr. Briggs for his careful and interested as well as interesting bacteriological work here reported and which, in reality, I am scarcely more than reporting to you, or recording, by this paper. Dr. Briggs report is as follows:

Specimens Examined.—Twelve, between Jan. 29 and Mar. 27, 1914. All with salt solution controls and the last five with subtilis skin infection before operation.

Procedure.—In all cases the *solutions*, either of control, if provided, or direct from the fluid containing the skin strips was dealt with as follows:

1. Four drops were removed with a sterile pipette and inoculated on one agar slant and in one tube of plain, and one dextrose broth (2, 8, 12) from each specimen.

Results.—Scattered staphylococcus albus colonies on agar appeared in three cases (5, 6, 12); molds grew out on the second to the fourth day in two cases (3, 6); staphylococcus albus in broth (5, 6 but not 12), and subtilis (contamination from air (5) in only one (10) case.

2. One to 3 c.c. were removed with sterile pipette, added to broth tubes, inoculated with stock staphylococcus aureus and incubated.

Results.—All positive. In the dilutions used the salt solutions were not inhibitive of pyogenic cocci.

The skin strips were handled as follows:

1. A pea-sized bit was cut (with sterile instruments), washed, drawn over agar slants or pour plates and then incubated (five cases).

Results.—No growth (1, 3, 5); a mucor type of mold grew after three days (probably a contamination) in No. 2; scattering (four to six on a slant) colonies of a staphylococcus albus (12).

2. A piece, from 1/2 to 1 centimeter long, was cut under the usual precautions, slit up into "feathers" with scissors and dropped into a tube (4, 6, 7) or flask (8, 9, 10, 11) of broth. If there was no clouding, and smears and hanging drops were negative in seven days the result was considered as evidence of complete sterility.

Results.—No growth (4, 2, 7); no growth for twenty-four to thirty-six hours, followed by slow development of subtilis (8, 9, 10, 11); in 9, 10 secondary inoculations into fresh broth gave active growth, showing in flasks with skin the subtilis was inhibited.

This report shows that the salt solution containing the skin pieces was not inhibitory to bacterial growth; that the skin was sterile in practically every case, the few instances of growths being reasonably attributable to contamination, and that the bacillus subtilis was killed. The spores of this latter species are known to be remarkably resistant, being able to withstand a 1-1000 solution of mercuric chloride for periods up to one hour. This notable resistance prompted their employment in this series of experiments. I have not been convinced that a 10 per cent. alcoholic preparation of iodine will not destroy these spores in from two to five minutes, even when painted on the skin. In fact, I am inclined to believe the extent of the germicidal power of iodine depends more than a little on the manner of its application as well as upon the strength of the solution used. If the coating be made at first thick before a thin one is allowed to dry the penetration should be deeper or the deep penetration more perfect. If a thin coating is first made the skin recesses may be but partly filled, and when evaporation of the iodine has occurred a thin, impermeable barrier of iodine is left. Whether this layer is free iodine or an albuminoid salt I am not prepared to state at this time. If the latter then its removal from the skin for technical purposes, may be much more difficult than we would like. Turner and Catto (*London Lancet* 1911, i, 733) in their investigations used a watery solution (*loc cit.*) and with that found growths in but three cases of thirty-two used. They did not, however, remove the iodine from the skin as a preliminary step to their cultivating the skin pieces in nutrient broth for a period of seventy-two hours. This we have done in the work herein recorded and feel we have met the objections raised on that score by the critics of our earlier work in this field. I expect later to determine whether a preparation of iodine, stronger than used in this work, will destroy the spores of the subtilis in the skin recesses.

THE ROCHAMBEAU.

A PRELIMINARY REPORT OF AN OPERATION FOR GENERAL ENTEROPTOSIS.*

BY

HIRAM N. VINEBERG, M. D.,

New York.

I WISH to present to the Society the technic of an operation which has for its aim the relief of general enteroptosis and to make a preliminary report on the results obtained with it. My object in presenting it after an experience with it covering only about a year, is that it may stimulate others to try it, so that enough data may be obtained to reach a fair and just conclusion of its merits. No claim of originality is made as to the greater part of the technic of the operation, although some features of it differ from any description I have seen in the literature; but the uses to which the operation has been put are new, as far as I know. Every member of the society is, doubtless, familiar with the operation devised and described by Dr. A. V. Moschcowitz, for the cure of prolapse of the rectum. Briefly stated, it consists in a series of purse-string sutures, to obliterate Douglas' culdesac. It has been attended with signal success in prolapse of the rectum, and Dr. Moschcowitz assumed it would prove equally successful in cases of marked rectocele and cystocele.

Through the courtesy of Dr. F. Krug, a case in the Second Gynecological Service of Mt. Sinai Hospital, presenting such a condition, was assigned to Dr. Moschcowitz for operation. Neither the rectocele nor the cystocele was in the least benefited by the surgical procedure, but, as I stood watching the procedure and noting what it accomplished within the abdominal cavity, it occurred to me that with some modifications, it might be made to serve the purpose of relieving prolapse of the pelvic and abdominal organs, especially of the tubes and ovaries and of the cecum and sigmoid flexure. By adding to the technic a feature which would close off the anterior pelvic and lower abdominal spaces, thus diminishing in a marked degree the vertical area of the abdominal cavity, all of the organs contained in the abdominal cavity would of necessity be pushed upward by the changed relations of the intraabdominal pressure.

Technic of Operation.—A long median incision is made, extending

* Read at a meeting of the New York Obstetrical Society, April 14, 1914.

from the umbilicus to the pubis. The patient is placed in the extreme Trendelenburg position and the intestines are packed away, as much as possible, into the upper abdominal cavity by suitable gauze pads. An assistant with flexed hand and the fingers spread out holds the intestines away from Douglas' culdesac. Another assistant with a gauze pad held in a long gauze holder, pushes the body of the uterus downward in the anterior pelvic space. Douglas' culdesac is thus rendered empty and is fully exposed. A fold of peritoneum is caught on either side, as far down as one can possibly succeed in getting and the two folds are sutured together by a continued suture, either of catgut or Pagenstecher thread. The formation of this first shelf is the most difficult part of the operation. The next shelf is made in the same manner, a fold of peritoneum taken on either side, about 2 inches above the first and sutured. When this suture reaches the posterior wall of the cavity, it is made to catch the anterior longitudinal striæ of the upper rectum, so as to close the space completely and to prevent the possibility of the sigmoid slipping in between the shelf and the rectum. A third shelf, the same distance higher up, created in the same way, usually brings one up to the level of the pelvic brim and thus Douglas' culdesac is entirely obliterated. The next step of the operation consists in suturing the round ligament to the anterior parietal peritoneum (a technic devised by Dr. Harold Neuhof for retroversion) to within 1 or 2 inches of the uterine insertion. The remainder of the ligament on either side is employed for fixation sutures to the abdominal wall, in the manner described by the writer for retroversion (*Surg., Gyn. and Obst.*, vol. xii, p. 378, 1911). By means of these sutures the fundus of the uterus can be brought up as high above the pubis as one wishes (in my cases usually from 2 to 3 inches). We have now created a shelf posteriorly on a level with the pelvic brim, and anteriorly we have built up a partition formed by the round ligament and the uterine body, closing off the anterior pelvic space and lower part of the abdominal cavity. When the operation is completed, the ovaries and tubes rest, naturally, on the posterior shelf, on a plane with the pelvic brim. The cecum, which in these cases is found dipping for some distance below the brim, is held up in its proper position without any sutures. In preventing the mobile cecum from prolapsing over the pelvic brim, we remove one of the most potent causes of intestinal stasis, according to many who have given the subject of intestinal stasis especial study (Wilms, Klos, Coffey). With the cecum prevented from sagging down into the true pelvis the drag on the right kidney, by the cecum, the cause of prolapse of the right kidney,

according to Glennard, Longyer and others, is removed. The long sigmoid can no longer occupy Douglas' culdesac, as it is found to do in these cases of enteroptosis. Having diminished the vertical area of the abdominal cavity, in a considerable degree, it must follow that all of the abdominal viscera, the transverse colon, the stomach, and liver will be forced to occupy a higher plane in the abdominal cavity. This was very well illustrated in one of my cases in which, when the abdomen was opened, the convex border of the stomach projected several inches below the umbilicus, but, when I came to close the abdominal wound, the lower border of the stomach was no longer in view. Where there is marked diastasis of the recti muscles, as is not infrequently the case in these women with lax fiber, especially if they have borne one or more children, the recti muscles are exposed and sutured together and the fascia made to overlap in accordance with the technic usually employed for that condition.

I have performed the operation thus far ten times. In most instances the abdomen was opened for some other condition, such as retroversion or adnexal disease. Some of the cases are of too recent date to review at the present time. I will relate briefly the histories of a few of the earlier cases.

CASE I.—Mrs. S. R., patient of Dr. L. A. Goldberger, aged twenty-six years, married four years; one child, two years old; no miscarriages. For a year suffered from irregular menstruation, dysmenorrhea, severe backache, headaches, constipation, and marked loss of weight, having lost 60 pounds during that time. Patient is tall, emaciated and pale. Abdomen very lax, right kidney prolapsed to the umbilical line. Uterus in retroflexion, third degree, easily brought forward; the cervix deeply lacerated in both sides. Adnexa palpable, not enlarged.

Operation April 1, 1913. Amputation of cervix followed by laparotomy. On opening the abdomen the long sigmoid was found occupying Douglas' culdesac, which was very deep; the cecum was hanging down over the brim; the convex border of the stomach projected as far down as the upper angle of the incision, which was an inch below the umbilicus. Douglas' culdesac was obliterated in the manner described above, and the appendix, which showed no macroscopic changes, was removed. The uterus was then suspended by the round ligaments and the abdomen was closed by tier sutures with considerable overlapping of the fascia. The patient made an afebrile recovery. Six weeks later, when she came to my office, she presented a striking improvement. She had gained 15 pounds, and was entirely free of any symptoms. Yesterday (April 13), I heard from her physician, as the patient is out of town at present, that she has remained well and has been steadily gaining in weight.

CASE II.—Mrs. B. D. (patient of Dr. J. Spinner), aged thirty years, married six years; two children; last child four years old; one miscarriage at three months, five months ago. Ailing since miscarriage, anorexia, vomiting, irregular and painful menstruation, marked constipation, and thinks she has lost weight. Is very thin, abdominal walls thin and flaccid. Right kidney prolapsed to the umbilical line, cervix torn deeply in both sides.

Operation.—July 1, 1913. Amputation of cervix. Laparotomy. Both adnexa are prolapsed to the bottom of Douglas' culdesac, which is occupied by a voluminous and very movable sigmoid. The cecum hangs down over the brim of the pelvis. No ptosis of the stomach. The right kidney palpated through the abdominal incision is found very much prolapsed and very movable in its pocket. Appendix, apparently normal, was removed for prophylactic reasons. Obliteration of Douglas' culdesac, uterus suspended about 2 inches above the symphysis, by suturing the outer three-fourths of the round ligament to the parietal peritoneum and the inner fourth to the muscle and fascia as described above.

Patient made an afebrile recovery. April 13, 1914, patient feels and looks better. Bowels move daily without medicine, but she says she is still nauseated and has occasional attacks of vomiting. Examination shows that the uterus is well up in forward position. The adnexa, as well as could be made out, were not prolapsed. In the erect posture, the lower pole of the kidney could be barely palpated below the rib border.

CASE III.—Mrs. M. F., aged twenty-nine years, married eleven years; three children; last child three and one-half years ago. Ever since birth of first child, ten years ago, she has been in poor health, suffering from bearing-down pain, backache, constipation, loss of flesh and nervousness. Had been treated at various clinics and by several specialists without any relief. She is small, emaciated and pale. There is marked relaxation of the vaginal outlet, descensus of the uterus to the second degree, body flexed and enlarged 50 per cent., cervix torn bilaterally. Left adnexa prolapsed. Abdominal wall thin and flaccid. Right kidney prolapsed to the umbilical line.

Operation Nov. 25, 1913. Amputation of the cervix. Tait's operation for relaxation of the vaginal outlet. Laparotomy. Cecum found dipping down over the pelvic brim. A long movable sigmoid occupying the posterior pelvic cavity. There was no ptosis of the stomach. Left adnexa prolapsed. Operation as in Cases I and II. Appendix not removed. Closure of the abdominal incision with overlapping of the fascia. An afebrile recovery.

February 10, 1914, patient feeling very well. Has gained 10 pounds in weight, but is still suffering from constipation. On examination, a small doughy mass is felt in the left fornix, which is not tender. The uterus in is good position, the fundus lies about 2 inches above the symphysis. The lower pole of the right kidney can be barely palpated below the rib border.

I realize fully that, at the present time, the record of cases of ptosis of the large intestine with consequent stasis, call for x-ray

examination, which should be made before and after any surgical procedure, but the exigencies of my cases were such that x-ray examinations were not feasible. However, I hope in the near future to complement the records of some of my cases with such examinations prior and subsequent to operation.

751 MADISON AVENUE.

RUPTURE OF THE UTERUS DURING LABOR, REPORT OF A SPONTANEOUS CASE.*

BY

J. W. LONG, M. D.,
Greensboro, N. C.

(With two illustrations.)

IN pregnancy there is nothing more appalling or fraught with greater danger to both mother and child than is rupture of the uterus. A recent case of spontaneous complete rupture during labor has drawn my attention sharply to this terrible complication of a normal process.

Mrs. A., age thirty-two, married thirteen years, no former pregnancy, was taken in labor at term, 3.00 P. M., March 25, 1913. Dr. G. E. Jordan saw patient with Dr. Watson 5.30 P. M. Pains at that time were about five minutes apart, normal in character, continuing to get stronger and more expulsive. By 10.30 the head had descended well into the pelvis, the unruptured membranes were pressing slightly against the perineum, and the pains more expulsive in character. At the height of a uterine contraction the patient suddenly cried out complaining of undue pain in the abdomen; she had slightly hurried breathing for a few seconds but there was little change in the pulse. On examination, the head which was presenting had receded, and now could be felt in the right iliac fossa. The fetal pelvis was found in the left side of the abdomen. Within five minutes after recession of the fetus the placenta was expelled spontaneously. Abdominal pains ceased and the patient complained only of tenderness on palpation. Dr. J. V. Dick was called and at 1.30 A. M. delivered a dead baby per vaginam, by introducing his hand which came in contact with the feet, and making extraction. There was very little hemorrhage externally and the patient was not badly shocked.

The diagnosis of ruptured uterus was agreed upon and I was called. After a hurried ride, I saw the patient at 3.00 A. M. Patient looked rather exsanguinated, pulse 88, but weak. There was no more flow externally than follows a normal labor, the abdomen was slightly tympanitic and quite tender, especially in the lower left quadrant, the uterus could be felt per abdominam lying a little to the right of its

* Read before the Washington, D. C., Obstetrical and Gynecological Association March 13, 1914, and the Alabama State Medical Association April 22, 1914.

normal position. After putting on sterile gloves and having the vulva washed with bichloride solution, the hand was carefully introduced. It readily entered the dilated, limp cervix and discovered a large rupture in the left side of the uterus which passed into the broad ligament and apparently into the abdominal cavity. The hemorrhage being small, uterine contraction good, no intestinal prolapse, and the patient's general condition fair, it was not thought necessary to pack the rent; but an abdominal section was considered imperative. The patient was put into an automobile and taken 17 miles to St. Leo's Hospital.

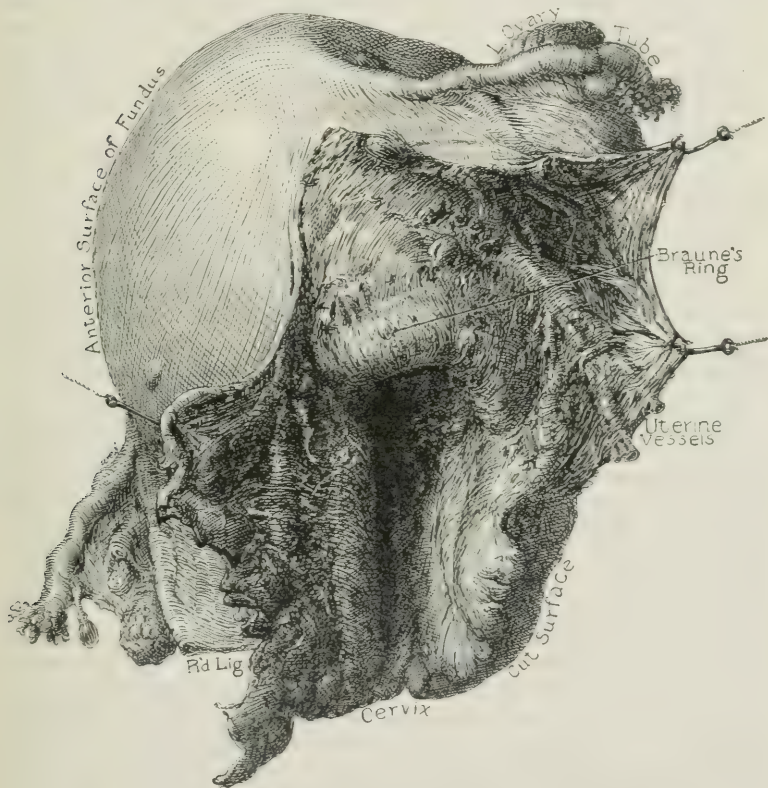


FIG. 1.—Ruptured Uterus, showing contraction ring of Braun.

A catheterized specimen of urine showed 8.75 grams of albumin to the liter, sp. gr. 1030, alkaline, appearance turbid, indican, hyaline and granular casts, pus, blood and epithelial cells present. The vulva and limbs were very edematous.

The abdomen was opened at 11.00 A. M., with the pulse 92, respiration 30 and general condition marked "poor." Operation lasted one hour and seven minutes, ending with pulse 110, respiration 30. On opening the abdomen there was found a considerable

amount of bloody fluid, evidently a mixture of blood, liquor amnii and peritoneal serum. There were some blood clots, meconium and vernix caseosa in the abdominal cavity. Numerous coils of intestines were congested showing signs of trauma.

Through the left side of the uterus was seen a longitudinal rupture coming from deeply in the cervix up through the body to Bandl's or Braun's ring, which can be clearly seen in the specimen. At this point the rupture seemed to have skidded over the contraction ring and involves only the superficial tissues, up to near the insertion of the round ligament. The cervical portion of the tear was like that in the body, longitudinal, with a transverse branch, the body having been literally torn loose from the cervix anteriorly half way round its circumference. Laterally the rent extended out through the broad ligament to above the pelvic brim. The rupture was just anterior to the uterine artery which could be felt pulsating quite superficial to the rupture.

Obviously the rupture could not be sutured, therefore, the uterus was removed supravaginally. A gauze drain was pushed through the vagina, while two cigarette drains reached into the pelvis from the lower end of the abdominal wound. Ample drainage was used because three general practitioners and a so-called surgeon had examined the woman. The fact that she was not seriously infected, nor her deplorable condition rendered irreparable, while being delivered, reflects great credit upon her attending physicians. The pelvic dimensions were normal; in fact, no physical cause for the rupture could be discovered.

The convalescence was almost afebrile, the temperature reaching 100° only on the fifth and eighth days. The nephritis and edema had disappeared by the tenth day. During the second week secondary anemia developed and proved to be a serious complication. The red blood cells falling to 1,800,000, the hemoglobin to 30 per cent., the white blood cells never over 7000. Gradually the blood picture improved, the patient leaving the hospital in forty-six days with 4,000,000 reds, 6500 whites and hemoglobin 65 per cent.

Happily, rupture of the uterus is not of frequent occurrence, yet it is an ever present menace to the pregnant woman. It is difficult to determine the correct ratio of ruptures to pregnancies, since some clinics report only complete ruptures while others include the incomplete. Among 385,593 labors occurring in the Moscow Maternity, New York Lying-in Hospital, Royal Charity, London, Bucharest Maternity, and the Berlin clinics, there were 387 ruptures, or one rupture to 937 labors; which is about the ratio of the Moscow series, 1 to 956. The Berlin series of 1896 showed five ruptures in 10,000 labors; the New York Lying-in statistics give 75 ruptures in 60,000 labors.

Hirst says rupture of the uterus is on the increase because of the present day tendency to do something active.

Harrar states that of 144 deaths occurring in 45,000 cases of con-

finement, rupture of the uterus is next to sepsis responsible for the greater number, namely twenty.

DeLee (*Year Book of Obstetrics*, 1913) notes that rupture of the uterus caused seven of the deaths of a total of fourteen in 16,000 labors of the Chicago Lying-in Hospital Dispensary service. It is more to be feared than sepsis.

The universal classification of complete and incomplete ruptures, the former meaning a tear that goes through the entire thickness, of the uterine wall in that portion covered by peritoneum, is not entirely satisfactory; nor should cervical tears unless they extend very deeply into the broad ligament be included, since they belong in a class by themselves. The old belief that ruptures always began on the inside and extend outward must be revised. Possibly this is true of ruptures below the reflection of the peritoneum; but higher up the peritoneum is often the first to yield. Schmauch (*Surg. Gyn. and Obst.*, vol. i, p. 260, 1905) claims that the rupture always begins on the outside when above the internal os. He says the uterus being a hollow organ and the peritoneum closely adherent, it is according to physiological principles for the outer layer to tear first. This would account for the so-called "peritoneal fissures." Knaur's four cases of external incomplete rupture substantiate Schmauch's views. He states that tears beginning in the peritoneum were observed as early as 1875. Berncastle records what is probably a case of this type in 1851 (Trask Series No. 385). The woman was delivered of a dead child; no hemorrhage. Two hours later, after severe fit of anger, she collapsed, and was found in *articulo mortis*. Postmortem showed: "Uterus uncontracted; dark extravasated appearances at right lateral ligament. Two pounds of blood had escaped; nothing unusual on inner surface."

The majority of writers state that complete ruptures are more frequent than the incomplete, and statistics seem to prove it; but C. H. Davis* is probably correct when he says that most complete ruptures were incomplete at first. This applies to rupture beginning in either mucosa or serosa (*Surg. Gyn. and Obst.*, July, 1913).

The potential cause of most ruptures of the uterus is twofold, both anatomico-physiological: first, the development of Bandl's contraction zone; and secondly, the normal thinning of the lower portion of the uterus. A critical review of all other causes brings home the conviction that they all hinge around these two con-

* I am much indebted to Dr. C. H. Davis, Chicago, for the courtesy of his private data, in the study of this subject.

ditions, unless, perchance, the rupture be due to some violent external trauma such as the rip from a cow's horn.

Softening of the lower uterine zone begins early in pregnancy. The so-called Hegar's sign depends upon its presence. I have often diagnosed pregnancy at six weeks, basing my opinion upon this sign, the subsequent history providing the correctness of the diagnosis. By the way, the sixth week is as early as Abderhalden claims to be able to make his serodiagnosis of pregnancy.

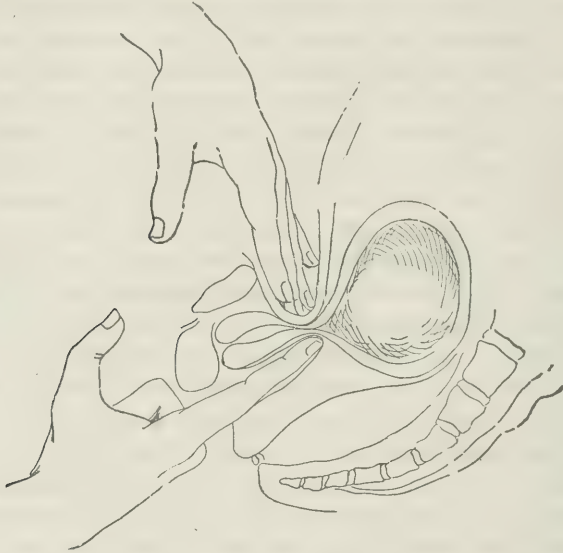


FIG. 2.—Hegar's Sign.

With the advent of labor the cervix takes on the characteristic softening and thinning peculiar to the lower zone of the body, so that by the close of the second stage the cervix hangs like a limp curtain.

While these conditions constitute potential factors, they were instituted for a wise and beneficent purpose, being concerned as they are in the propagation of the human race; and to become pathological must be greatly exaggerated or supplemented by some abnormality, for which we shall look further.

The determining, or should we say the precipitating, causes of uterine rupture naturally group themselves into those incident to: (1) the uterus itself, (2) the fetus, (3) the pelvis, (4) the vagina, and (5) trauma. We shall notice only the major ones.

Those inherent in the uterus are principally: (a) cicatrices due to former operations, such as Cesarean section, amputation of the

cervix, and fixation operations; (b) degenerative changes in the uterine wall, induced by former pregnancies, hydatids and tumors, placenta previa, and edema of the cervix; (c) congenital or acquired abnormalities; and (d) prolonged, dry, exhausting labor, of itself usually dependent upon some other factor.

Any operation upon the uterus that leaves a scar, or fixes the organ, renders it vulnerable to rupture should pregnancy follow. Especially is this true of Cesarean section. Trask (1856) collected four cases of rupture following Cesarean. He cites six other cases gathered by Keyser. In these latter days when the indications for this operation are being multiplied, more women than ever are being subjected to the dangers of uterine rupture from this source. One general practitioner in North Carolina did five Cesarean sections within six months. In 1886 Krukenberg (*Arch. f. Gyn.*, Bd. xxviii, p. 408) reported twenty cases of uterine rupture, following Cesarean section, and says that 50 per cent. of all pregnancies after the old Cesarean ruptured. In 1908, Brodhead (*AMER. JOUR. OBST.*, vol. lvii, p. 650) reported two cases of his own with eighteen others published within the preceding five years. Wyss (*Beiträge zur Geburtshilfe und Gyn.*, xvii, No. 3, p. 287, 1912) reports two cases and collects forty-two. The mortality was high and he emphasizes the importance of not doing Cesarean unless it is strictly needed. The latest paper on the subject is by Breitstein (Feb. 28, 1914) (*Jour. Am. Med. Assn.*, lxii, p. 689), who reports a case. Counting only those cases mentioned in this paper we have fifty-three ruptures following Cesarean section. On the other hand it has been pointed out that careful technic, perfect apposition of the uterine wound, and freedom from sepsis insure better results, but not immunity. Vogt (*Arch. f. Gyn.* Bd. xcv, HI, 1911; *AMER. JOUR. OBST.*, 1912, vol. lxv, p. 322) says that after modern methods the accident is rare. He quotes Kuster as having had no rupture after 100 Cesareans, Leopold none after 232, and Sanger none after 500. Olhausen had one rupture following 120 Cesareans.

All writers emphasize the part that infection at the time the Cesarean is done plays in causing rupture in future pregnancies, and that the woman who has been Cesareanized should spend the last month of her following pregnancy in the hospital.

The uterine scar after Cesarean section in its relation to rupture during subsequent pregnancy has been studied by a number of men, notably by Harrar (*AMER. JOUR. OBST.*, 1912, vol. lxv, p. 808). The condition of the scar was noted in fifty patients who were Cesarean-

ized more than once. In forty-two instances the scar could not be seen or was represented by a slightly depressed whitening, and was solid with no thinning. There were four cases of marked attenuation of the old scar. In Harrar's series there were four instances of rupture following repeated Cesarean section. In three of the ruptures the scars of the Cesarean sections were perfect and rupture had taken place between the scars. Harrar reasons that scars close together injure the blood and trophic nerve supply. Sections taken from the edges of the wound showed that the rupture was through normal tissue. His cases point two morals: first, Cesarean section carries a danger to future pregnancy not dependent upon infection; second, in doing a second Cesarean the scar of the first should be removed.

Repeated pregnancies by impairing the woman's general health, lessening the resistance of the uterine tissue, leaving scars from incomplete unrecognized ruptures and operations make the multiparous woman eight times more liable to rupture than is the primipara. 482 ruptures gathered from Bandl, Winckel, Koblanck, Kolaczek, *et al.*, show 432 multiparæ, against only fifty-seven primiparæ. Ruptures are frequent among para- vii to xv (Breitstein).

Placenta previa constitutes a fruitful source of rupture. Lobenstein (*Bull. Lying-In Hosp.*, N. Y., vol. vi,) had from this cause five cases in forty-six complete ruptures, and thirteen in twenty-nine incomplete. Many such cases are found in the literature. Add to placenta previa the trauma of rapid dilatation or version and the wonder is that more uteri are not ruptured.

Schmauch says that in placenta previa there are six times as many cervical tears after version as there are following spontaneous delivery.

Implantation of the placenta upon the site of former trauma; as incomplete rupture, removal of submucous fibroids, deep curettage, or any lesion that heals without leaving a thick normal wall invites invasion of the deeper tissues by the chorionic villi, thereby greatly impairing the integrity of the uterus. The result is obvious.

Regarding prolonged labors, Trask gives a list of 147 cases in which the time from the beginning of labor till the rupture occurred, was recorded. Thirty-eight ruptures took place within the first six hours, thirty-six during the second six hours and 104 or 70 per cent. in the first twenty-four hours. He compares these figures with Collin's statistics of 15,850 normal cases in which 13,412 or (80 per cent.) the labor was terminated within six hours.

The rupture was attributed to the use of ergot in sixteen cases

in the Trask series. More recently we are seeing accounts of rupture produced by pituitrin.

The fetal causes of rupture are mainly hydrocephalus, monstrosities, manipulation and twins. One reason for these abnormalities causing rupture is that they give frequent cause for intrauterine manipulation.

Of 1460 ruptures, there were sixty-six instances of hydrocephalus. Counting backward Keith collected seventy-four cases of hydrocephalus with sixteen ruptures.

Malposition, either transverse or otherwise necessitating version is the fetal condition in this country we would expect, *a priori*, to be the most frequent source of rupture.

The pelvic condition most often responsible for rupture is according to Lobenstine the generally contracted pelvis of moderate grade. Davis tabulates 588 contracted pelvises in 1342 ruptures, or 40.83 per cent. The statistics of the Lying-in Hospital of the city of New York show twenty-one contracted pelvises in forty-six cases of complete rupture, or 45.65 per cent. These figures indicate the importance of knowing the pelvic measurements in advance. It appears that the majority of ruptures, dependent upon material conditions, occur among the people who have the highest percentage of contracted pelvises.

This brings us to the consideration of the most prolific source of uterine rupture, namely, trauma. The classification usually adopted of spontaneous and traumatic ruptures comes out here in bold relief. Yet, the etiological factors dove-tail into each other so closely as to make it hard to discriminate, in many instances, as to which is the one at fault.

Trauma includes a wide variety of causes from the gore by a mad bull to a sneeze, but, as a rule, traumatic ruptures are due to manual interference. Hirst says, "Undoubtedly unskillful use of instruments, manual procedures, and failure to recognize dystocia are responsible for most ruptures." Valenta reports sixteen cases and says that most of them were due to improper treatment by midwives. DeLee says, spontaneous rupture is excessively rare, trauma is almost always determinable to have preceded it.

A brief survey of the causes of uterine rupture shows that there are four groups due to some abnormality on the part of the patient, and one to the unfortunate accoucheur. In this connection it must be admitted that the obligation of the physician, in a measure, extends to every case, not always as to the primary cause, but to the resulting rupture, provided, of course, that the patient come under

his care at the proper time. Hirst's dictum, that "That accident is rightly regarded as a reproach to the physician in whose hands it occurs" requires qualification and must be interpreted as implying responsibility for sins of omission as well as those of commission.

Mitigating circumstances must also be considered. The friability of the uterus is under certain conditions almost beyond belief and constitutes one of the most confusing problems the obstetric surgeon is called upon to handle. Instance, placenta previa.

Furthermore, the foundation for uterine rupture often dates back to some remote illness, or operation, the significance of which is not appreciated at the time of the impending rupture. Dec. 2, 1913, a para-iv, aborted at the fourth month, and on the twenty-eighth day of typhoid fever. Later she was brought from her home in a distant state and placed under my care for the repair of old lacerations of the cervix and perineum. The fundus was found *in situ*, slightly subinvolved, the adnexa normal. Cervical and urethral smears showed gonococci. At operation Feb. 2, two months after the abortion, a large sound was introduced. It passed in deeply, without meeting appreciable resistance, evidently perforating the uterus. The friability of the uterus was demonstrated to the physicians present by holding the sound as delicately as a pen can be poised, when it again penetrated the uterine wall. Hysterectomy was done at once; the patient making a good recovery.

Now then, who can say when a "dessicans myositis," as the Germans call a softening of this kind, will disappear? Suppose with this softened condition of the uterus the patient becomes pregnant and transverse presentation develops, and version be done, and rupture occur, and the intestines slip through, and the patient dies. What about the unlucky obstetrician who delivered the still more unfortunate woman? It should not be set down that rupture of the uterus even in the presence of manual interference is *per se* evidence of unskilful manipulation.

A personal communication from the Medical Officer in charge of the great Charity Hospital of New Orleans states, that there are only two cases of rupture of the uterus on record in the history of that hospital. In each instance the woman was delivered by version, rupture resulted, followed by death. No one imagines for a moment that the Charity lacks for skilful operators. We should not be too hasty to condemn the man who ruptures a uterus.

The statement of Krukenberg that "after the old operation of

Cesarean section 50 per cent. of the cases resulted in rupture in subsequent pregnancies," shows clearly that the responsibility for the rupture should at least be shared by the man who did the previous Cesarean section. The same principle applies to any uterine operation.

The question is a big one, involving as it does the life of the patient and that of her babe, the reputation of the physician, and in this day of "the ambulance chaser", a possible suit for damage.

Hemorrhage is one of the cardinal symptoms of uterine rupture, also the chief cause of the immediate and much of the late mortality. It is largely responsible for the shock and disturbed circulation. It is always primary and often secondary. Its degree depends upon the size and number of vessels opened. Should the rupture miss the placental site and the uterine arteries, the hemorrhage is less and the prognosis correspondingly better. The external hemorrhage is usually more copious in extensive incomplete rupture, and Koblank says the danger is relatively greater. This is questionable. In complete ruptures the external hemorrhage may be insignificant; while internally it is copious. The presenting part may block the pelvis and in either type prevent the escape of the blood. When an incomplete tear develops from the peritoneal side the hemorrhage all goes into the abdominal cavity. Schmauch says that almost one-third of all deaths in placenta previa are due to hemorrhage from the torn cervix. Fortunately many cases escape the dangers of primary hemorrhage. The case reported in this paper had surprisingly little hemorrhage.

Shock is always present to a greater or less degree. The hemorrhage, the sudden bursting of the distended uterus, the precipitation of the fetus and the placenta into the abdominal cavity, all contribute to the production of shock.

Hernia of the intestines or omentum through a possible rupture is pathognomonic, and constitutes a grave complication. About seventy instances of prolapsed intestines have been reported.

The principal problems we are called upon to consider in the management of rupture of the uterus are, the hemorrhage, delivery of the child, prolapse of the intestines, shock, and infection. The chief causes of death are hemorrhage and infection. The older authors considered that one-half the deaths were due to hemorrhage; more recently infection is being considered the cause of the greater number of deaths. Koblank cites fifty-nine deaths, thirty from infection, twenty-four from hemorrhage, five uncertain. Ivanhoff records 101 deaths with about the same percentage. Petren, who

tabulated 754 cases with 516 deaths, says, of those who do not die of hemorrhage, the prognosis is determined by the degree of infection. Every measure of relief instituted must be employed with the idea of combating these two life-destroying factors.

Should the fetus not have been delivered when called to the case, what is the best method of procedure? The concensus of opinion appears to be that if the head be within easy reach the forceps or cranioclast should be employed, delivering **per vias naturales**. In case the presenting part has receded too far for the application of either of these measures, and the fetus or the greater part of it is still within the uterus, shall version be done? This is a debatable question. The objection to version is the danger of increasing the rupture, thereby causing more hemorrhage. Petren says, terminate quickly, if possible, but never by version. Petren, Leopold, Zweifel, *et al.*, object to delivery per vaginam should the fetus be in the abdominal cavity, in whole or in part, for fear of increasing the tear and hemorrhage, and causing prolapse of the intestines, and infection. Another more serious objection is that recession of the presenting part so far as to make version necessary is the most characteristic phenomenon of complete rupture with partial or total extrusion of the uterine contents into the abdomen. Now, suppose that delivery can be effected by version, what are you going to do about the rupture? Clearly, there is only one thing to do; namely, open the abdomen and deal with the situation as one finds it. This does not apply with such force to incomplete ruptures. Here the so-called conservative method may sometimes be adopted; namely, snug packing with gauze control the hemorrhage. The gauze should be gotten out as early as possible since its presence may increase the infection and induce secondary hemorrhage from pressure necrosis. Gauze packed in too firmly may render an incomplete rupture complete. Suturing the rent through the vagina is possible and proper only when it can be easily accomplished.

Were I away from a hospital without competent surgical help and equipment at hand, and my patient sustained a rupture of the uterus and the presenting part slipped back out of reach, I would keep my fingers out of the vagina and transport the woman to the nearest hospital. Should she be bleeding considerably, I would tampon under the strictest antiseptic precautions possible, put on a snug abdominal binder, give a hypodermic of morphine and atropine, and take her to the hospital.

With the patient in the hospital what will you do? The battle has raged for generations around the conservative and radical meth-

ods of treatment. I assert with confidence that the surgeon of this day should not be biased by the old statistics. Even the so-called conservative methods would give better results in the hands of the modern surgeon than was attained formerly, since sepsis and asepsis are so much better understood, while the operative method gives an infinitely lower mortality.

The rational thing to do in a case of complete rupture is to open the abdomen, deliver the child and the placenta and control the hemorrhage. The greater the shock the greater the hemorrhage; therefore, the more urgent the demand to control the bleeding quickly. Have an assistant start a hypodermoclysis, while you are getting into the abdomen. The same principal applies here as in acute abdominal hemorrhage from other causes. For instance I have ridden to the hospital in the ambulance with an almost pulseless patient from ruptured extrauterine pregnancy, and an abdomen literally full of blood; prepared my hands with the greatest haste and as rapidly as ever I could opened the abdomen and seized the bleeding vessels; afterward to see my patient go home in two weeks, well. In one such case I had to cut a plaster jacket off before I could get to the abdomen. Another case requiring prompt action and a Cesarean section because of the dangerous hemorrhage was one of placenta previa.

All along many obstetric surgeons have said open the abdomen in complete rupture, and I would add, in doubtful incomplete ruptures. Merz twenty years ago in the beginning of the aseptic era tabulated 320 cases occurring in the preceding thirty years, and came to this conclusion. Trask with his 417 cases gathered in 1848-56, in the very dawn of a proper understanding of the subject, showed that in twenty-nine cases "gastrotomy" saved twenty-two or 76 per cent., while in 118 cases of turning, perforation, etc., only thirty-eight or 32 per cent. survived.

The child removed by expulsion, extraction per vaginam, or abdominam, what shall be done with the ruptured uterus? There are four methods: drainage per vaginam, suture of the wound, supra-vaginal amputation, total hysterectomy. Drainage is to be restricted to cases known to be incomplete.

Suture of the wound is the ideal plan and should be employed in cases where the edges are clean cut, the hemorrhage easily controlled and infection not imminent.

However, any case of rupture that has been handled per vaginam, unless it be very little and with the strictest antiseptic precautions, should be regarded as infected to a greater or less degree. Hence,

each case is somewhat a law unto itself as to whether the rent should be sutured or the uterus removed. The more infection present or probable, the more urgent the indications for hysterectomy. If the patient were greatly shocked, I would probably suture where otherwise supravaginal hysterectomy would be the operation of choice. Other things being equal, I prefer to do a supravaginal rather than a total hysterectomy, unless the location or condition of the rent demand the latter. Draining through the vagina is somewhat better after a total removal, but the shock is less following the supravaginal method.

Since most cases of uterine rupture are traumatic and, therefore, preventable, the accoucheur should forestall this calamitous accident by a comprehensive knowledge of the situation. This implies that the obstetrician be more than midwife, and not sit supinely by, waiting, McCauber-like, for something to turn up. The wise man foreseeth evil and avoideth it.

One should go thoroughly into the history of his patient, as to former pregnancies, operations, diseases, habits, condition of the kidneys, etc. He should also inform himself of the pelvic measurements, condition and probable size of the fetus, the presence of tumors or obstructions, and the chances of a normal delivery. The lazy habit the majority of physicians fall into, of depending upon vaginal examinations to determine the presentation and position is to be deplored. The wise obstetrician makes full use of external palpation and measurements, meanwhile keeping his fingers out of the vagina, except under circumstances of dire necessity. He should be able to recognize his patient's limitations and not allow labor to continue unreasonably long. The woman who has been Cesareanized, or had her cervix amputated, or has a contracted pelvis, must not be allowed to strain too hard or long.

This still leaves a considerable class, embracing the neglected, the sudden, the unsuspected, the spontaneous, and the seemingly unavoidable traumatic cases, which are to be dealt with according to the principles herein outlined and the circumstances of the individual case.

FATTY CONCRETIONS IN OVARIAN DERMoids.

BY

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(With one illustration.)

THE consideration of dermoid cysts and their contents is a very interesting and, at times, a rather perplexing subject. Perplexing in the fact that the nature of the material within the dermoid is at times very different and may be found aggregated into small ball-like masses, each ball being separate and not tending to adhere to its fellows. The occurrence of these individual balls has been difficult of explanation and, at present, there is little definite information on the subject. Thus the reason for the development of the peculiar structures within the cyst is still an open question and remains to be finally settled.

The purpose of this paper is the discussion of one of these peculiar types of dermoid cysts, and to offer, if possible, an explanation for the occurrence of the concretions in the case at hand.

Patient, Mrs. C. R., aged forty-nine years, believed that her present condition of ill-health began about four years after a miscarriage thirty years ago. At this time, she was curetted. She suffered repeated attacks of sharp and severe pain in the right flank which radiated up her side. In January, 1911, the pain became more severe and, in addition to an asthmatic condition becoming worse, necessitated her going to bed. The pain still continued, usually beginning in the right leg and radiating over the abdomen to the right chest. Her last menstruation was very profuse. She had no leucorrhea. She suffered general bearing down pains and backache with frequent desire to urinate.

At operation (May 12, 1911) an ovarian cyst on the right side was removed. The pedicle of the cyst showed a torsion.

Description of Cyst.—The specimen which was received consisted of an ovarian mass with its Fallopian tube attached. The ovary was large, measuring 20 centimeters in diameter. The walls were externally smooth, but on palpation gave the sensation of irregular thickened areas. The color of the serosa was a milky white, with here and there dark areas of congestion. The surface of the cyst showed many large vessels which radiated from the base of the mass. Through the wall of the cyst a number of small spherical bodies could be felt. When

opened, the cyst was seen to contain innumerable putty-like concretions, ranging in size from a pea to a marble, and several larger masses of the same consistence, in which were incorporated many dark brown hairs. The surface of the smaller masses was smooth and of a uniform yellowish-gray color. Many of the concretions showed flat surfaces or facets due to their close apposition to others as they completely filled the cyst. There was no free fluid in the cyst. On section the cut surface of the balls had a homogeneous greasy appearance

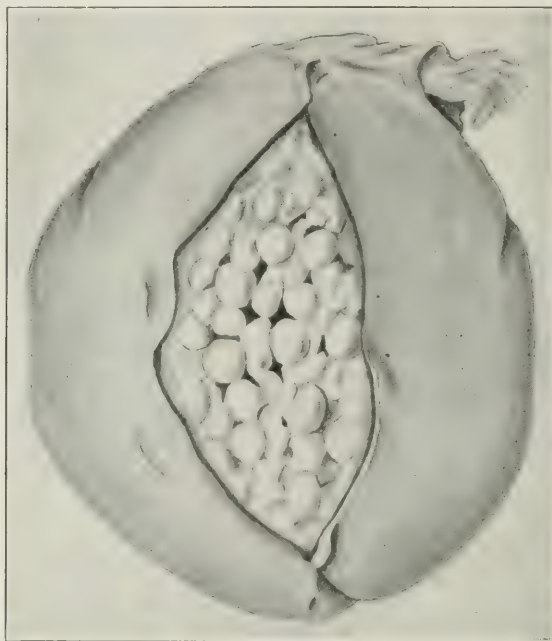


FIG. 1.—Dermoid Cyst with fatty concretions.

with a central irregular cleft, in which was seen a clear brown oily fluid. On section the large masses did not show this central structure but a central core in which many hairs were matted together. The lining of the cyst wall was smooth. The wall showed a number of thickened areas, several of which were quite pale and of a pearly character, while others were of a dark slate color. The cut surface of these areas had a homogeneous cartilaginous appearance.

Microscopical sections of the wall of the cyst showed a structure which was rather loose in places while in others it was quite compact and firm. In places there was an extensive infiltration of red blood cells which replaced considerable areas of the tissue while a large num-

ber of firm-walled and dilated blood-vessels were also present. The tissues of the wall were especially loose in the inner layers where there were seen large pale areas of edema. The wall in its middle and outer third was more firm and here the blood spaces were more abundant. The lining membrane varied in its picture, presenting in places a rather thick layer in which there were seen cells without nuclei, while in other places, the lining was thinner and made up of cells with deep staining oval nuclei. The cells in both instances had a stratified arrangement and were of polygonal character. The superficial layers of the lining membrane showed keratinization and in places, especially where the cells had no nuclei, desquamation of cells could be seen. In places the inner surface of the cyst wall showed no evidence of epithelial lining. Here the surface was covered by a granular amorphous débris which extended for some distance into the wall. Where the lining cells were distinct, a definite supporting membrane was present. Scattered through the wall, and particularly in the epithelial tissues of the lining membrane, there was a diffuse infiltration of inflammatory cells. These consisted for the most part of polynuclear leukocytes and plasma cells, although a number of large endothelial-like cells were also present. This reaction approached the inner surface, especially in those places where the wall was devoid of a lining membrane, and here the inflammatory cells were seen scattered through the granular débris occupying the surface. Other sections of the wall showed, in the deeper layers of the sub-epithelial connective tissue, hair follicles and sebaceous glands. In the immediate vicinity of these structures the inflammatory reaction was not as intense as that in other parts. In these same sections there was seen on the surface a considerable amount of homogeneous pink-staining granular material, some of which was present in the sebaceous glands. Scattered through the middle third of the wall were seen small bundles of muscle cells which were packed between the bands of fibrous tissue. These bands of fibrous tissue were wavy and in places very dense, especially in the thinner portions of the wall. Throughout the wall there were scattered collections of blood pigment, the remains of former hemorrhage.

Sections of the concretions showed them to have no definite structure and no enveloping membrane. The matrix consisted of a granular amorphous material in which the "ghosts" of cells could be seen along with irregular, short, thread-like structures, looking not unlike fine hairs. The whole mass stained uniformly with hematoxylin save a few small, round, hyaline-like bodies which stained with eosin. The "squames" were irregular in shape and showed creases

and folds. Some of these were quite large and looked as though several squamous epithelial cells were joined together. In one section there were seen several masses of cells with deep staining blue nuclei. These cells formed quite large irregular islands and consisted chiefly of polynuclear leukocytes with a number of large endothelial-like cells similar to those in the cyst wall. No relationship between these cells and the surrounding substance of the concretion could be made out. In the outer part of the concretions the substance was more closely packed and stained more deeply. There was, however, no evidence of a stroma or of cells forming an enveloping membrane. Sections stained by van Gieson showed no evidence of connective tissue.

Smears made from the concretions stained with Sudan showed large round fat droplets with a great deal of finely granular material also taking this stain. Sections counterstained with hematoxylin showed the outlines of the epithelial squames. These cells showed the same characters as those above described.

The fat contained within the concretions was semisolid at room temperature and of smeary character. By placing a ball in a test-tube and immersing the tube in a water bath, a golden yellow liquid fat was seen to escape but the ball retained its general form save that it showed a number of crevices. This golden yellow fat was identical in color and consistency with the oily fluid observed in the central cleft of the concretion. A ball placed in ether lost its form and a cloudy yellowish solution was obtained, leaving, however, a considerable undissolved granular sediment. Stained smears of this residue showed many of the "squames" as well as a great deal of amorphous débris which also stained with the hematoxylin.

Direct smears of the dermoid balls showed no evidence of cholesterol crystals, but on examination with Nicol's prism many doubly refractile bodies were seen while the presence of cholesterol was obtained by Salkowski's test.

A comparative examination of the lipid material in ordinary dermoids and of the concretions showed the following:

- | Ordinary dermoid. | Dermoid concretion. |
|-------------------------------------------------------|-----------------------------------------|
| 1. Material semifluid at 37° C. | 1. Concretions semisolid. |
| 2. Much hair intermixed. | 2. Few hairs in concretions themselves. |
| 3. Small granular fat particles. | 3. Large fat drops. |
| 4. Small amount of débris. | 4. Much débris of cells. |
| 5. Squames, few. | 5. Squames, many. |
| 6. Cholesterolin (chemically). | 6. Cholesterolin (chemically). |
| 7. Double refractile bodies present in great numbers. | 7. Double refractile bodies present. |
| 8. No inflammatory cells. | 8. Inflammatory cells. |

The comparative analysis of the two types of material showed that the material in the concretions differed somewhat from the ordinary dermoid contents. In other words, it would seem that the cyst in question was originally of the ordinary type and that owing to a subsequent change in its contents an unusual physical appearance was brought about. This change would seem to be due to the action of a number of factors, the chief of which was the addition of dry keratinized cells and other cell débris accompanied by a change in the character of the fatty contents of the cyst.

The presence in the wall of the cyst of a very marked inflammatory reaction and the finding of inflammatory exudate and leukocytes in sections of the dermoid balls indicates that there had been an inflammatory reaction on the inner surface of the cyst and that the exudate had become mixed with the sebaceous material. The addition of an exudate of this nature would offer substances which might easily change the nature of the fatty compounds. Particularly of note would be the enzymes liberated on dissolution of the inflammatory cells which to a greater or less extent would act upon the lipid compounds. It is impossible to indicate the exact nature of these reactions. It is interesting, however, that a greater number of double refractile bodies were seen in the ordinary dermoid material, than in the fatty concretions of the case under discussion. With this difference in the fatty content and the addition of products of an inspissated exudate, together with the epithelial squames, the material has become dry and crumbly. The presence of the great amount of amorphous granular débris resulted from the disintegration of the desquamated cells and the cells of the exudate. The large size of the fat droplets, as compared with the small granular fat in ordinary dermoids, also indicates an alteration in the character of the lipid material. From the appearance of the sections of the concretions, the relatively large amount of granular débris suggests that its physical properties played a very important part in the preparation of the material for the formation of the concretions.

A recent article by M. Lippert thoroughly reviews the literature concerning the occurrence of fatty concretions in dermoids together with the findings in a case which came to Schwalbe's laboratory.

The many explanations for the occurrence of these fatty concretions contain interesting points for discussion. It would appear from our findings that some authors lay too much stress upon factors which seem of relatively minor importance.

In order to explain the occurrence of these sebaceous concretions it is at once necessary to determine the change which has been

brought about in the contents of the cyst as differing from that in ordinary dermoids.

It has been the opinion of Askanazy, Olshausen, Plenz, and others that a torsion of the pedicle of the cyst with the subsequent serous effusion into the cavity of the cyst was the primary cause for the occurrence of the globular masses. Further it was suggested that a mechanical influence had been exerted upon the fat suspended in the fluid and by a kneading motion had led to the formation of the balls. In support of this contention Plenz found that it could be imitated in analogous experiments. Kermauner formed flat flakes by the addition of sulphuric acid and barium chloride to a fatty suspension. He concluded, however, that although the ball formation was not unlike a colloid precipitate, it was uncertain whether this occurrence *in vitro* was analogous to the ball formation without further evidence. In his conclusion Kermauner recognizes the uncertainty of his observation as there are reported cases where there was no fluid present in which the fat could be precipitated. Among such reported cases are those of Latsko, Mohr, and Schwalbe, while no sign of fluid was found in our cyst. In the three cases cited above there was also no evidence of torsion of the pedicle. The cases of Latsko and Schwalbe were ovarian dermoids while that of Mohr was a dermoid cyst of the floor of the mouth.

Torsion of the pedicle of the cyst is a point upon which much stress has been placed. A torsion is a mechanical obstruction to the circulation brought about by a twisting of the pedicle. The obstruction may vary in its intensity and, depending upon this, several conditions may occur, namely, edema, an inflammatory reaction or gangrene. The three conditions named would form a sequence of events following one upon the other in the presence of a severe prolonged torsion. If torsion played a part in the picture presented by our case, it would appear that it induced an acute inflammatory reaction with the pouring out of a cellular exudate into the cavity of the cyst.

Latsko, in whose case there was neither torsion of the pedicle or fluid in the cyst, believes that a physicochemical process must have occurred with the change of the character of the contents from the fluid form to the solid state. He goes still further and says that a mere mechanical forerunner can be precluded in his case as there was no fluid in which the concretions could be rolled up and broken off.

In his original article Schwalbe, in discussing the occurrence of the fatty concretions in the case recently reported by his pupil, M.

Lippert, says that an intimate mechanical mixture of the fat with epithelial scales would guarantee a holding together of the masses at body temperature. In an analysis of the fat of the concretions he found the melting-point to be 30° C., and that of a simple dermoid between $28-30^{\circ}$ C., both considerably under the body temperature. In the microscopical examination of the masses he found them to be made up of large fat drops and a finely granular débris mixed with a great number of epithelial scales. He attributes the great number of epithelial scales to the fact that the cyst was completely lined by a stratified squamous epithelium showing cornification. In the examination of the fat of the other dermoid he found a finely granular fat with a small number of epithelial scales. The lessened amount of the scales was attributed to the fact that the cyst was not completely lined by squamous epithelium.

He found that when a concretion was placed in the incubator for twenty-four hours it still retained its form and further that when placed in boiling water the form was not changed. In order to prove his contention that only an intimate mechanical mixture of the fat and epithelial scales was necessary for these concretions, he demonstrated their artificial formation by working together the sebaceous material of dermoids with bread crumbs. These artificially produced concretions indicated physical properties similar to those from dermoids.

In conclusion Lippert says the primary cause of the ball formation depends upon the character of the cyst contents. Upon this fact the whole question of the occurrence of these fatty concretions is based and it would appear that the inflammatory reaction which is evidenced in our case had something to do with the proper preparation of the contents.

Although the chemical analyses of the fat in the two dermoids examined by Schwalbe indicated a similar mixture it would appear from the microscopical examination that a physical or morphological change had occurred in the fat of the sebaceous concretions. In the fat of the concretions there were found large fat drops in comparison to the finely granular fat in the ordinary dermoid material. Whether this morphological difference is purely a physical one or indicates a chemical change would be hard to say unless the material were examined immediately after removal from the body, owing to the tendency to decomposition of fatty compounds on preservation. However, from the characters presented it would appear that there was some difference in the fatty material. As stated before, Latsko was of the opinion that such a change had occurred in his case.

Rokitansky, referring to the formation of the concretions, indicated

that in addition to the presence of an exudate a rolling and tumbling movement of the cyst facilitated the formation of the masses.

The addition of a large amount of cell detritus undoubtedly makes the material dry and crumbly. Such an addition could be offered in a purulent exudate which had become inspissated, of which we have evidence in our case in the presence of an inflammatory reaction in the wall of the cyst and on its inner surface. Furthermore, inflammatory cells were found in the sections of the balls which showed that a purulent exudate had been mixed with the fat.

In our case the mixture of epithelial scales with the fat did not appear to be the prominent feature. In paraffin sections epithelial cells were seen to be widely separated by a finely granular débris and were in very small amounts compared with the large amount of débris. Some of this débris could be accounted for by the disintegration of the lining cells while the evidence of a purulent exudate in the cyst cavity would also account for much of it. The addition of such an inspissated exudate in life would be analogous to Schwalbe's experiment in which he added bread crumbs to bring the fat into a proper consistence for moulding. Then with the material in a mastic state and with the natural cohesive power of the fat these small particles would be welded together as the cyst was rolled about on its pedicle.

Since the foregoing study was completed we have had the opportunity of studying a dermoid (sebaceous) cyst of the scalp which showed a similar arrangement of its contents into small ball-like masses as above described. The specimen was removed by operation from a man of fifty-nine years by Dr. A. Stewart, Surgeon to the Mercy Hospital.

The cyst occupied the scalp in the upper anterior part of the left temporal region and consisted of a mass the size of a tangerine orange measuring 5 centimeters in diameter. The wall of the cyst was quite thin and showed a white, scaly, keratinized epithelial lining. Microscopical examination of these scaly flakes showed epithelial squames and enormous numbers of cholesterin crystals. There was no evidence of fluid in the cyst and there were no hairs present. The contents consisted of a crumbly light brown sebaceous material in which small balls varying from the size of a match head to that of a pea were mixed together with irregular pieces of a soft white material similar to that adherent to the wall. Microscopical examination of the white material in the contents showed only solid masses of cholesterin crystals. The striking feature of the contents was its dry crumbly nature and the fact that each one of the small balls was

found lying in a pocket separate from the surrounding material. These sebaceous concretions were quite rough on their surface. In this respect they were quite different from the balls described in the foregoing case. On section these balls did not contain a nucleus of any kind and, moreover, there was no evidence that the white flakes of cholesterin material ever acted as such. It is very suggestive that in this case we are dealing with the early or incomplete formation of the ball-like masses of sebaceous material. The variation in size also points to the fact that the process was incomplete at the time of operation. Only a few masses had reached the final stage of ball formation.

Microscopical examination of the cyst wall showed it to be lined by a fairly thick layer of stratified squamous epithelium surmounted by a heavy keratinized stratum. In the subepithelial tissues there was quite a marked inflammatory reaction made up chiefly of polynuclear leukocytes together with a few lymphocytes and an occasional plasma cell and eosinophile. At certain points these inflammatory cells could be seen breaking through the epithelial lining.

Microscopical examination of the contents showed enormous numbers of closely packed epithelial squames, cholesterin crystals, fine granular fat and débris. In paraffin section of the concretions, the appearance was quite similar to that described in the previous case, save for the fact that in the present instance the "squames" appeared to be more numerous and that inflammatory cells of the polynuclear type were more easily demonstrated.

I am indebted to Dr. Oskar Klotz for assistance during this study and in the preparation of the paper, and to Dr. X. O. Werder for the materials of the first case.

TRANSACTIONS OF THE AMERICAN GYNECOLOGICAL SOCIETY

*Thirty-ninth Annual Meeting, Held at Boston, Mass.,
May 19, 20, and 21, 1914.*

*The President, J. WHITRIDGE WILLIAMS, M. D., of Baltimore,
in the Chair.*

After an address of welcome delivered by DR. FRANCIS H. DAVENPORT, of Boston, which was responded to by DR. SETH C. GORDON, of Portland, Maine, the reading of papers was proceeded with.

FORWARD FIXATION OF THE CERVIX AS A PREDISPOSING CAUSE OF
SOME RETRODEVIATIONS OF THE UTERUS AND
AN OPERATION FOR ITS RELEASE.

DR. EDWARD REYNOLDS, of Boston, said the diagnosis of forward fixation was best obtained by adding to the ordinary observation of the shape of the uterus, of the direction of the vaginal cervix, and of the presentation of the os, a further estimation of the mobility of the cervix, which was obtained by the attempt to move it upward and backward with the finger or with a double hook.

A short series of observations on women some of whom had, and some of whom had not the abnormality commonly called ante-flexion, would establish in any one's mind the normal mobility of the cervix and the degree of forward fixation which might be considered an abnormality, and would he thought further establish the comparative frequency of a degree of this abnormality which was mechanically effective.

The operation which he had now come to adopt as a matter of routine in all cases of the operative treatment of retrodeviations which showed any considerable degree of forward fixation of the cervix was to precede the abdominal treatment of the retrodeviation by a method of vaginal release of the forward fixation which he had already once described, but which he would briefly recapitulate here, more especially as he thought he had decidedly improved his technic since the date of his former paper.

After a preliminary dilatation and curettage the vaginal wall was seized with forceps immediately in front of the cervix and divided with scissors throughout its thickness, a narrow transverse strip being removed. The length of this transverse incision must vary somewhat with the size of the individual vagina, but it should ordinarily be just sufficient to admit the operator's index-finger. The anterior lip of the cervix was then seized with a volsellum forceps, one blade of which entered the vaginal wound, while the other lay within the cervical canal. Traction downward and backward brought Goffe's ligament into view. This was also divided transversely with scissors over the whole width of the transverse wound, so exposing the loose connective tissue between the cervix and bladder. All the tissues in front of the cervix were then separated from it with the index-finger passed through the wound up to or slightly above the level of the internal os, and as far out to either side as the finger could conveniently reach, thus freeing the anterior surface of the broad ligaments as well as the cervix. The transverse wound in the vagina was then brought together by a transverse running suture, thus elongating the anterior vaginal wall. If the transverse wound was too wide some narrowing of the vagina might result, but if this was watched for it could be easily avoided by a slight variation of the suture, *i.e.*, by bringing the lateral extremities of the cut together in the reverse direction (longitudinally to the vagina instead of transversely). During the first stage of this little operation there was free bleeding, but it came only from the cut edges of

the vaginal wall, and if the division of the deeper tissues was done with the finger all bleeding would be controlled by the sutures. It was often well to make sure that the cavity was clear of clot before closing it either by the use of a sponge or by irrigation. At the conclusion of this stage of the operation the cervix was found to have become freely movable and to have receded into the posterior cul-de-sac, but since it was still crooked and the os still looked forward it was well in most cases to complete the operation by a discission of the posterior lip. This he formerly did after the method of E. C. Dudley, but experience had shown that this method led to a subsequent eversion of the cervical mucous membrane in so large a proportion of cases that instead of making a simple median incision he now removed a lozenge-shaped portion of the posterior lip by four cuts of the scissors. The first two cuts divided the edge of the os in the median line, but at the other end were from a quarter to a third of an inch apart, the next two cuts started at the extremities of the other two and met in the median line, thus removing the lozenge. The upper apex of the lozenge should be externally at or nearly at the vaginocervical junction and internally reach almost to the level of the angle of flexion in the individual case. Two sutures longitudinal to the vagina, one on each side of the cut, then brought the longitudinal points of the lozenge together at the cervicovaginal junction, thus shortening the posterior lip of the cervix and yielding a straight uterine canal. After the recovery of the patient from ether the lower pole of the uterus could now be drawn strongly backward and upward by the unopposed action of the uterosacrals, and the application of a suspension, or of any of the standard round ligament operations to the upper pole completed the operation. There was now everything to keep the fundus forward and no opposing force to turn it backward.

Since the adoption of this procedure his percentage of failures after operation for the retrodeviations had diminished almost to the vanishing point, and he had come to feel that with this addition almost any one of the accepted operations was as good as any other.

He thought that if the members would treat his two main points, namely, that abnormal anterior fixation of the cervix was the predisposing cause of the posterior deviations of the fundus, and that the operative release of this forward fixation of the cervix was a most potent addition to our means of combating such retroversions as needed operative treatment, they would soon be forced to the point of accepting them as established.

DISCUSSION.

DR. HERMAN J. BOLDT, of New York City, stated that what was called "anteflexion of the cervix" by the essayist—and by all other writers—he had been accustomed to use the term "retroversion of the cervix," considering the direction of the cervix from the position of the external opening. It was a condition which was always congenital unless caused by pelvic inflammation.

Heretofore he had always looked upon the shortened, and not

infrequently indurated, condition of the sacrouterine ligaments as being the main factor in causing this position of the cervix, and had, on a number of occasions in the last twenty years, cut the shortened ligaments to overcome the backache of which many women so afflicted complained, several times relieving this symptom by the surgical intervention.

That the holding forward of the fundus was due to the action of the round ligaments was, in his opinion, questionable in the greater number of such instances. These ligaments were not taut, except when the bladder and the rectum were full. The condition was usually an association of ante flexion of the body of the uterus with a retroversion of the cervix; and unless there was an atrophy of the anterior cervicocorporal junction, probably as a result of long standing of the condition, we would find the tissue at this junction unyielding; indurated, if he might call it so, since it was impossible to straighten it permanently by manual or mechanical means. Hence the mechanical dysmenorrhea of which many patients frequently complained. The usually present shortened anterior vaginal wall was part of the congenital malformation, and was, of course, an additional factor in causing a retroversion of the cervix.

He had always regarded the shortened and thickened sacrouterine ligaments to be a low-grade inflammatory process—a parametritis posterior. Furthermore, when the condition was of long standing and more or less atrophy had taken place in the anterior part of the cervix at the flexion angle, due to long duration and not infrequently increased size of the body of the uterus, the organ could not straighten itself by any pathological factor brought to bear upon it. We might see the uterus assume a position farther backward in the pelvis, thus constituting a retroposition, and then the intraabdominal pressure might cause a still more acute flexion angle.

DR. HENRY T. BYFORD, of Chicago, had usually regarded this condition of forward fixation of the cervix with retroversion of the uterus very much as the rest of the members. He had in many cases separated the bladder from the uterus quite extensively through a transverse incision and had drawn the parts together from the side to the median line, but he had not done exactly the same operation as that described by Dr. Reynolds. He had operated with the idea that when he drew the connective tissue from the sides of the cervix as far back as he could, he was drawing the tissues taut, getting support in front of the cervix which would hold it back more, making lateral support, in that way replacing the cervix backward by the support of the connective tissue to the sides of the cervix, instead of releasing the cervix merely from the traction of the anterior abdominal wall.

DR. I. S. STONE, of Washington, D. C., thought the suggestion of Dr. Reynolds had been more or less covered in effect by the Mackenrodt fixation operation for retroversion, that is, denudation and separation from the anterior vaginal wall, dropping forward of the body of the uterus and fixing the anterior vaginal wall would answer the same purpose and would overcome permanently the retroversion.

DR. J. WESLEY BOVEE, of Washington, D. C., stated that about fifteen years ago he began to do this work. He devised surgical procedures on the lower ligaments of the uterus. He read a paper on this subject at the meeting of the American Medical Association in 1902, and another at the meeting of the American Gynecological Society the same year as a part of a symposium on the treatment of retroversion of the uterus. In searching the literature of the Surgeon-General's library in preparation of those papers, he was surprised to find his work had been anticipated by Dr. W. H. Byford, who had shortened the utero-sacral ligaments in 1878 (vide 4th ed. of his book, *Practical Gynecology*, 1888). Much information and inspiration were received from reading Byford on the subject.

DR. JAMES R. GOODALL of Montreal, said that after listening to the paper of Dr. Reynolds', it struck him that two classes of cases were being placed in one category; that the type of acute ante flexion of the uterus and the type of retroflexion were two distinct types which could not be considered as belonging to one class. For instance, if we took young girls who complained of severe dysmenorrhea, we would find associated conditions of the vagina and pelvis. Associated with an acute ante flexion of the uterus there was a short anterior lip of the cervix and a long posterior lip. This type of uterus, when removed from the body and held by the cervix, could not be undone. The anterior uterine wall was very fibrous in part, and it was a type of uterus which in his experience seldom, if ever, became retroverted or retroflexed. This type of girl was big, muscular, whose physical development had gone on to an advanced stage, but the pelvic organs had remained somewhat infantile. In the other type of case, in which retroversion and retroflexion took place, there was a lack of tone and a tendency to enteroptosis even before pregnancy had taken place, and with this type of uterus the fundus could be flopped about in very few hours after death. In one type of case, with acute ante flexion, the cervix was drawn into the hollow of the sacrum; in the other type, we did not get a long cervix, such as we would expect to find in a case of acute ante flexion.

These were absolutely two different types of cases which should not come in the same class, for in the one class we had tautness of the uterosacral ligaments, while in the other there was a laxity of everything and marked elongation of the uterosacral ligaments.

DR. REYNOLDS, in closing the discussion and in replying to the remarks of Dr. Goodall, said he made a distinction between these two classes of retroverted and ante flexed uteri. Retroversion seldom occurred in the class in which the anterior wall at the angle of flexion was hard and firm, and when he began to work with Dudley's operation, he was doubtful whether the ante flexion could be corrected for any purpose in that class of cervix. Where we thought the cervix was the cause of the mechanical dysmenorrhea, release of the anterior fixation and posterior discission would straighten the uterus.

AN INTERNAL ALEXANDER OPERATION.

DR. HENRY T. BYFORD, of Chicago, considered the Alexander operation the most satisfactory for replaceable retroversion due to relaxation of the pelvic tissues. If lacerations about the vaginal entrance were present they were also repaired. Operations upon the uterosacral ligaments were not advocated in ordinary cases because, according to the experience of the author, these ligaments would gradually grow shorter after an Alexander operation if a small-sized pessary was worn for a few months to protect them from overstretching.

When a median abdominal incision had to be made for pelvic conditions, the ligaments were shortened through that incision in such a way that they drew toward the internal inguinal ring, as in the Alexander operation, and in such a way that the sutures were extraperitoneal. A fold was taken in each ligament and sutured. These folds were drawn through a peritoneal puncture near the internal ring and attached along the inner surface of the abdominal wall at this point, but extraperitoneally. This was easily accomplished by separating the peritoneum from the abdominal wall on either side as far as the internal ring.

DISCUSSION.

DR. BENJAMIN R. SCHENCK, of Detroit, Michigan, stated that the operation described by the essayist mechanically did not differ very much from the Mayo or the Barrett modification of the Gilliam or the Ferguson operation. In both the Mayo and Barrett modifications the side of the incision was lifted up and forceps introduced over the rectus and out under the subperitoneal tissue until one came to the internal ring, and then it was punctured and the ligament drawn through. It differed from the plan of Dr. Byford in that the ligament was not sutured together or folds were not sutured, but they were brought over the belly of the rectus muscle where they were fastened in the center.

In the early days there was great enthusiasm manifested for the Alexander operation, and later there was considerable enthusiasm shown for suspensio-uteri, which was especially manifested at the Atlantic City meeting in 1902; then at the meeting in 1908 the views of many men had changed and became quite different from those expressed in 1902. This evolution had to do with the Alexander operation, then with suspension, and then with the various intra-abdominal methods of shortening the ligaments. The Alexander operation was successful or unsuccessful in proportion as to whether it happened to be applied to uncomplicated cases or to those that were complicated by adhesions or disease of the adnexa. It was on account of the failures that suspension, which was the operation done when the abdomen first began to be opened extensively, became unpopular. It took years to find out the failures of the

suspension operation which was an evolutionary procedure, so that we had come back to the principle of the Alexander operation, but applied in such a way that we did not have the disadvantages of that operation now.

The chief requisites for any operation for retroposition of the uterus were mainly four: first, relief of the symptoms; second, permanency of results; third, freedom from trouble during pregnancy and danger during labor; and, fourth, freedom from late trouble, such as intestinal obstruction due to the intraabdominal manipulations.

He had done 172 operations for retroposition, and suspension 109 times. His general impression was the results were satisfactory. He did the Webster-Baldy operation eleven times, and occasionally did it now; the Coffey operation six times, and the Gilliam or its modifications forty-six times. He was rather late in giving up suspension; he kept at it longer than most men did, so that he had had only forty-six of the Gilliam's and the various modifications.

His results from the standpoint of pregnancy were not favorable; no series of operations for retroposition were followed in a large number of cases by pregnancy on account of the nature of the operation, but as far as he could judge he had had only four cases, two after suspension, with no trouble, and one after the Coffey operation without trouble, but a recurrence of the retroposition afterward, and one after a Gilliam operation which was satisfactory.

DR. GEORGE GELLHORN, of St. Louis, Mo., thought the Alexander operation should be eliminated from the list of operative procedures for retroflexion of the uterus. In uncomplicated and freely movable retroflexed uteri, as a general rule, no operation of any kind was justifiable. In such cases we should wait a little while before subjecting them to operation and try the use of pessaries anyway. With the present comparative safety of laparotomy, any intraabdominal operation was preferable to the Alexander. What particular method should be employed could be safely left to the judgment of the operator in the individual case, just so long as we did not swear by any one method, because it would be forcing the patient into a shoe that might not fit her if we used one and the same method in all cases.

DR. I. S. STONE, of Washington, D. C., had tried the method described by the essayist in a few cases since his preliminary report, and so far as he could judge the results were satisfactory. There was some doubt about any future method which gave attachment of the ligament or any tissue to the under side of the abdominal wall, at the same time being outside of the peritoneum. This was the only weak point of the operation, and there would be greater strength and security if they were attached outside of the fascia, and this could be accomplished, if necessary, by using the Kelly curved needle and drawing the ligament through the abdominal wall, even under the skin. The operation was a distinct advance over what was known as the Mayo operation, where the forceps was forced through and plunged right along through the inguinal canal at the risk of and almost certain injury to the nerves in the canal which might to some

extent embarrass the patient and possibly embarrass the surgeon to explain why certain nerves were injured thereafter. The Byford operation did not do this, hence in that respect it was excellent.

As for the results of the operation, they were quite as good temporarily as by any of the other methods. For himself, he should say that the Franklin H. Martin operation in all cases in which the abdomen was not necessarily opened was the most reliable, the most successful, and it had good philosophical reasons for being successful in the fact the greater length of the new attachment of the ligament had to extend from the ring across under the skin of the pubic bone to the spine and Poupert's ligament of the opposite side. Dr. Byford's operation necessitated opening the abdomen, and there should be other surgery required than that for simple retrodisplacement of the uterus.

DR. JOHN G. CLARK, of Philadelphia, said that Dr. Schenck alluded to the Mayo operation. Since the publication of Dr. Simpson's article, credit should be given to Dr. Simpson rather than to Mayo.

DR. F. F. SIMPSON, Pittsburg, referred to a very common error which led to confusion with regard to the different types of operations. The retroperitoneal shortening operation was spoken of as the internal Alexander operation and as the modified Gilliam operation. It was neither an internal Alexander nor a modified Gilliam. The essential feature of the Alexander was that the peritoneal cavity should not be opened. The essential of the Gilliam operation was that it should draw the round ligaments directly across the free peritoneal cavity, leaving two bands stretched across the peritoneal cavity beneath which the intestine might slip and become strangulated. That seemed to a great many men to be an unsurgical procedure, and at a meeting of the Southern Surgical & Gynecological Association held in Cincinnati in 1902, there were three papers read which described a method of intraabdominal but retroperitoneal shortening of the round ligaments, by drawing them forward, but essentially different from the Gilliam or Ferguson operation, in that the shortening took place beneath the parietal peritoneum. Nature originally placed the round ligament beneath the parietal peritoneum and it seemed wise to imitate her in shortening them. Those papers to which he referred were read by Dr. Ferguson of Chicago, Dr. Noble of Atlanta, and himself. He stated in his original paper that the essential principles should be that the ligaments should be drawn forward and shortened, but that they should be placed beneath the parietal peritoneum. He further stated at the time that there would be various modifications in the details of technic. There were sixty slight modifications in the next two years.

As to the results of the operation, in 1910 at a meeting of the American Medical Association he reviewed the results in something over 300 such operations. This review consisted in personally seeing the patients or having a physical examination made by the family physician within a few weeks before the meeting. Of that number, the uterus was in forward position in 98 per cent. of the

cases. There were 2 per cent. of failures. The failures occurred in the class of cases referred to by Dr. Reynolds in his paper, cases in which the bladder was attached low on the cervix and drew the cervix forward, the high attachment of the sacrouterine ligaments drawing the fundus backward.

Following pregnancy—and there were forty odd cases in eight years—the round ligaments thus shortened tallied identically with the course of ligaments which had never been stretched. They elongated during the course of pregnancy; the uterus emptied itself and contracted, and the ligaments were long enough to permit the uterus to drop into the hollow of the sacrum whether the ligaments had been previously stretched or not. If the obstetrician permitted the uterus during the puerperium to remain in the hollow of the sacrum the ligaments would not contract strongly enough to draw it forward and they would remain permanently too long whether they had been previously stretched or not or shortened or not. By overcoming this, by keeping the uterus in the natural position, he believed the vast majority of cases of retroversion following delivery would be prevented.

DR. J. WESLEY BOVEE, of Washington, D. C., said there were three points that should be reckoned with in this procedure in this portion of the abdominal wall, namely, first, by making the opening too small to draw the ligament through, there was danger of constricting the connective tissue immediately adjoining the serous layer which might constrict the ligament to the extent of lessening markedly its pulling power; second, in there being a little too large an opening with an eversion, or the turning out of a raw surface toward the peritoneum, to which adhesions might take place about the ligament, and third, the danger of trouble in causing separation of the peritoneum from the extraperitoneal tissue.

ULTIMATE RESULTS FROM SURGICAL INTERVENTION IN SIMPLE
CASES OF CHOLELITHIASIS AND CASES IN WHICH
GALL-STONES WERE FOUND COINCIDENT
WITH SOME OTHER OPERATION

DR. JOHN G. CLARK, of Philadelphia, reviewed 160 cases of cholelithiasis in which he emphasized the fact that modern surgery had entirely recast the clinical history of cases of cholelithiasis and that in the newer interpretation symptoms which formerly were considered as essential for the establishment of a diagnosis of cholelithiasis were now looked upon as terminal rather than initial indications of biliary defects.

At the meeting of the American Gynecological Society in Boston one decade ago, he reported several cases of cholelithiasis associated with gynecological lesions. As a summary of his views at that time he quoted as follows:

“1. The usual statement that 95 per cent. of gall-stones produce no symptoms is fallacious because it is drawn from autopsy and dissecting-room statistics.

"2. Bile is not bactericidal, for in the majority of cases of cholelithiasis microorganisms of a more or less pathogenic nature are discovered.

"3. Under these circumstances many more or less vague symptoms attributed to gastrointestinal or general constitutional disturbance may arise from toxins elaborated around these foreign bodies in the gall-bladder.

"4. All clinicians admit that there is a wide hiatus in the clinical symptoms between the early formation of gall-stones and the so-called classic attacks of biliary colic with jaundice.

"5. Abdominal surgeons should make a most careful record of all gastrointestinal or hepatic symptoms and other vague epigastric pains and associate these with an examination of the gall-bladder, with a view to establishing a further link in the symptomatology of cholelithiasis.

"6. As cholelithotomy in a large series of cases has been attended with less than 2 per cent. mortality, the coincident removal of gall-stones with some other abdominal operation is not a hazardous undertaking.

"7. This coincident operation should be dictated by most careful judgment, for if the patient is in a critical condition from a prolonged operation, or the primary operation has been a septic one, this extra operation may be attended by serious results."

That this interpretation had been entirely sustained he believed the present report of 160 gall-stone cases would amply prove. Since then he had made even a more careful study of the symptomatology of cholelithiasis and in only a minor percentage of these coincident cases were foreign bodies innocuous.

It was with great interest, therefore, that in association with his assistant, Dr. Block, he had traced a very large proportion of his cases of gall-stone operations with a view of determining whether the present attitude of removing gall-stones that were found in the course of some other operation, regardless of whether they are producing symptoms, was justifiable. In one group he had included cases in which there was an operation for cholelithiasis without any associated gynecological condition. In the second group were found all of the cases in which gall-stones were discovered in association with gynecological or other abdominal operations.

In only 14 per cent. of his series of 160 cases had he failed to secure accurate notes as to the outcome. In this list, no case had been included which had been operated upon under nine months. It was to the ultimate recovery that he had particularly directed his attention in this study of cases.

In his earlier cases he uniformly stitched the gall-bladder to the peritoneum of the anterior abdominal wall, thus sealing it off from the general peritoneal cavity. He had learned after considerable experience that a biliary fistula frequently healed slowly in these cases, and often patients complained of dragging or pulling pain at the site of the attachment for some time after their discharge from the hospital. This caused him to abandon this method and to use

an improvised drainage tube, which could be securely sutured into the gall-bladder. In this way the gall-bladder sank back into its normal position and was not held in a constrained position against the abdominal wall. Since the adoption of this plan he had noted a marked improvement in the prompt closure of the drainage track and in the subsequent comfort of the patient. Through this means he had secured perfect drainage and if there had been persistent postoperative nausea this tube had served excellently in facilitating the introduction in a reverse way of normal saline solution into the duodenum as recommended by McArthur.

In all cases where there was nausea after twenty-four hours, he attached a saline reservoir to the drainage tube and under 1 foot of hydraulic pressure permitted the fluid to drop slowly into the gall-bladder. Great care was observed to avoid the slightest excess of pressure which might induce a rupture about the point of insertion of the tube in the gall-bladder. The drainage in his series had usually been maintained for ten days. This rule was an arbitrary one and in some cases the length of the drainage period might be extended. Within the last two years he had turned toward cholecystectomy in a greater proportion of cases, for experience had shown that if the wall of the gall-bladder was thick and indurated or if it was dilated and very thin, or if, on inspection of the interior of the organ, the mucosa was eroded or showed a strawberry mottling he performed a cholecystectomy. Experience had shown that in cases where there were few or no symptoms present, the removal of gall-stones with a ten days' drainage period was followed by complete recovery and there were no postoperative sequelæ; on the other hand, when the gall-stones had caused more or less extensive changes, the outcome so far as a complete recovery was concerned might be very unsatisfactory. Under these conditions the patient might continue to complain and might return for the removal of the gall-bladder. As he viewed these cases from the study of the after-histories, he was convinced of the necessity of a more frequent resort to cholecystectomy. Occasionally he had closed the gall-bladder without drainage after the removal of uncomplicated gall-stones, but he preferred to use a simple drain for fear of the rupture of the gall-bladder and escape of bile into the peritoneal cavity was thus avoided.

From this series of cases he concluded that:

1. Simple drainage was sufficient in all cases of cholelithiasis where there were no symptoms attributable to their presence.
2. When the gall-bladder was thickened, greatly dilated, or was the seat of the so-called strawberry change as described by Moynihan, cholecystectomy was preferable.

So-called gastralgia, indigestion and dyspepsia, he would place in heavy type and let it stand out so boldly that it would serve as a target to be immediately demolished. In his series of cases many had been referred to the gynecological wards, for the repair of a lacerated cervix or perineum or correction of a retroversion of the uterus with clearly defined symptoms referable to the upper abdomen

that were considered by the family physician as reflex manifestations and yet an accurately traced history left no doubt as to their true significance. In fact, he was a pronounced pessimist when it came to the consideration of reflex abdominal symptoms in the upper abdomen emanating from gynecological lesions. In his instruction to students he constantly laid stress upon this point. One dictum was, "Locate your symptoms anatomically and then seek for the lesion in that locality." Failing in this quest, then one might extend the diagnostic excursion to immediate or more remote organs.

Subsequent to parturition latent gall-stones frequently became active or a cholecystitis might develop. This, he believed, was attributable to the lessening of intraabdominal pressure with sagging of the gall-bladder and liver, thus causing a stagnation of bile and the onset of an attack of cholecystitis. As a much larger percentage of gall-stones occurred in child-bearing women than in other women, and also because a larger percentage occurred in women than in men, the gynecologist should be especially alert in the study of symptoms incident to disease of the organs of the upper abdomen. Serious error, therefore, was especially likely to hide within the shadow of a reflex doctrine, which might justly cast grave discredit upon gynecology.

In gynecological cases with coincident symptoms in the upper abdomen, the gall-bladder was by far more frequently the seat of disease than any other organ. In a vastly larger series of gynecological cases, gastric or duodenal ulcers, or cancer of the stomach, had been so infrequently found as to be almost negligible. Therefore, when the upper abdominal symptoms were vague and one encompassed within a small anatomic circle the possibility of the pylorus, duodenum and gall-bladder, the ratio of incidence was greatly in favor of the gall-bladder as the seat of trouble rather than either of the other two organs. In fact, as his cases ran, the ratio was at least 80 to 1. In case of doubt the diagnosis of cholelithiasis or cholecystitis should therefore invariably have the preference.

In answer to the question, when should gall-stones be removed as an incidental part of a gynecological operation? He said that he still adhered to the precautions laid down ten years ago which were as follows:

"The coincident operation should be indicated by careful surgical judgment, for if the patient is in a critical condition from a prolonged operation, or if the primary operation has been a septic one, this extra operation might be attended by serious results."

In his series there was no case where gall-stones had been removed or even searched for if there had been a recent septic focus in the pelvis. In every instance where there was a record of a coincident operation for gall-stones in an inflammatory case it had been in the chronic stage when all activity had disappeared. In no purulent stage, even if there were decided symptoms of cholelithiasis, was even an exploration of the upper abdomen made. He preferred to let well enough alone, and return to the attack after the first battle

was won if symptoms indicated other disabilities in the upper abdomen.

In estimating the immediate and remote results of these combined operations he had arranged his cases under three separate headings—first, simple gall-bladder cases, in which the surgical treatment was directed to the relief of cholelithiasis; second, the cases in which some pelvic operation was performed and gall-stones, not producing symptoms, were discovered; and third, gynecologic cases in which there were unmistakable symptoms of associated gall-bladder disturbance.

So far as immediate mortality was concerned the first group consisting of fifty-one cases was attended by 6.1 per cent. immediate mortality, the second by 4.3 per cent., and in the third there was no fatality.

As would naturally be expected the possibility of infection was proportionably greater where two or more operations were performed, first, because of the greater number of surgical incisions, and second, in changing from one operation to another the greater hazard of defects in technic. To avoid these errors the employment of separate sets of instruments and rubber gloves in each new operation was essential. So far as the instruments were concerned there was none that was more hazardous in repeated use than the surgical needle. For instance, in a simple hysterectomy a needle used in closing the uterine stump should be discarded, for there was always danger of its contamination from passage through the cervical canal, and it therefore might inoculate a fresh wound if passed through it. In these combined operations the greatest care should be observed in changing from one operative field to another. In no instance did he employ any of the instruments used in a plastic operation in the pelvic zone, and the same precaution should be observed in the performance of a third operation in the upper abdomen.

Notwithstanding these precautions his series of combined operations had shown a higher percentage of wound infections than in simple gall-bladder operations in which there was a 5.9 percentage of wound infections; in the combined operations, 9.7 per cent. in one series and 9 per cent. in the other. This referred to any degree of wound infection from a small point to a more extensive break in the entire incision. The greater time consumed in these operations also predisposed to greater hazards in convalescing. Thus post-operative vomiting and phlebitis were observed in a slightly larger degree in the combined operations. In the entire series pneumonia occurred in only one case.

Of the six fatalities in his series of cases, four of the cases died from the destructive results of advanced cholelithiasis. In only two could death be attributed to any defect in operative technic. In one, there was a leakage with the formation of a subphrenic abscess; in the other a peritonitis. These two deaths might have been avoidable.

The point which the first four fatalities should drive home to every physician was that when pancreatitis of a chronic type supervened, the biliary condition sank into insignificance in comparison with the grave dangers of this terminal sequel. Among the latter,

the surgical mortality was exaggeratedly high. In none of the combined operations where there were no symptoms attributable to gall-stones was there a fatality.

DISCUSSION.

DR. REUBEN PETERSON, of Ann Arbor, Michigan, said he had been palpating the gall-bladder for the last ten or twelve years whenever the abdomen was opened for other purposes. In the University Hospital, where most of his cases were, he had a service where all cases which were distinctly gall-bladder cases were sent to the surgical side; whereas everything gynecological was sent to the gynecological side, so that in most of the cases that fell into the category of those mentioned by Dr. Clark there were no distinct gall-bladder symptoms. Roughly speaking, he found in about 1000 abdominal sections that there were gall-stones present in about 12 or 14 per cent. This included his own private cases as well as the University Hospital cases. Going back over the histories, he found that there were symptoms which had escaped the historian, so that if one had been more on the lookout for them before operation they would have fallen into the category mentioned by the essayist. He had adopted just the one operation of simply removing the gall-stone or gall-stones and draining. He had not removed the gall-bladder in any case. He had found quite a percentage of cases where he did not think it was advisable to perform any operation upon the gall-bladder. He had found an unusually large proportion of cancer cases that had gall-stones. In the pus cases he had refrained from operating upon the gall-bladder. It was surprising to observe the regularity with which gall-stones were found when one palpated for them. It required great care; that a gall-stone or gall-stones would be overlooked, especially if the gall-bladder be distended with bile, and unless one was careful in the palpation the gall-stones would not be found. In a good many cases of abdominal section he had found that the proportion of gall-stones was less than under other circumstances, so that he thought that this was a point that should be considered in reference to this question.

DR. PHILANDER A. HARRIS, Paterson, New Jersey, had not often removed gall-stones from patients when operating upon them for gynecological troubles. Altogether he did not think that he had removed gall-stones in more than half a dozen cases. He had often left them in because the history of the cases had been defective or because he was not able to get a history of gall-stone trouble, so that without that history, and without the possible announcement on the part of the patient she had gall-stones, he had often been afraid to prolong the operation.

He was rather surprised to hear that Dr. Peterson had found gall-stones present in 12 per cent. of the cases he had palpated through abdominal incision. This proportion seemed rather large to him. He did not believe that he had found gall-stones in more than 5 per cent. of the cases he had palpated through the abdominal incision,

so that in this respect his experience did not correspond with that of Dr. Peterson. He recognized that in many cases the stones might have been small and finding bile flowing out of the gall-bladder slowly the gall-stone or gall-stones were not discoverable. He had not found them in every case in which they were present because if they were small they could not be found.

He had removed the gall-bladder in at least 70 per cent. of the cases on which he had operated, something less than two hundred in number, and he had operated repeatedly once or twice in many cases. His experience taught him that the thorough removal of the gall-bladder was good practice, and that now a number of operators were advocating the removal of the gall-bladder, being careful to remove it down close to the common duct and to remove it all.

THE EFFECT OF LAPAROTOMY UPON THE CIRCULATION.

DR. W. D. GATCH, of Indianapolis, stated that the anatomical arrangement of the abdominal vessels presented three points of special significance: 1. The circulation through the abdominal viscera was through two sets of capillaries, separated by the portal vein and its radicles. This must slow down the rate of the circulation through the abdominal organs. It was well known that the pressure in the vessels of the liver was very low. 2. The veins of the abdomen had walls so thin that they were easily compressed by the slightest pressure upon them. 3. None of the abdominal veins had valves.

How was the flow of the abdominal organs maintained? He could think of four forces which were involved. These were the force of the heart, the negative pressure of the thorax, the movements of the muscles surrounding the abdominal cavity, and as suggested by Mall the peristaltic movements of the alimentary canal. It was certain that the force of the heart drove the blood as far as the first set of capillaries. Did it assist the flow beyond this point, or was the flow from here back to the thorax maintained wholly or in part by the other forces?

The key to this problem was furnished by the behavior of the abdominal circulation when the intraabdominal pressure was markedly elevated. It had long been a clinical puzzle why patients with peritoneal effusions under great pressure (as high in some cases as 50 or 60 mm. of mercury) showed so little disturbance of the general circulation. It would seem that such a pressure would compress the thin-walled vena cava and other abdominal veins and prevent any flow through them yet these patients might have no disturbance of circulation in the legs and no abnormal elevation of the general blood pressure.

In a series of experiments carried out on dogs, he took simultaneous tracings of the intrathoracic pressure, of the intraabdominal pressure, of the pressure in the inferior vena cava, and of the general blood pressure. The pressure in the vena cava was taken by thrusting a canula up through an opening in the femoral vein.

He raised the intraabdominal pressure by injecting warm salt solution into the peritoneal cavity.

The tracings showed that the intraabdominal pressure and the pressure in the inferior vena cava were always equal and rose and fell together. When the intraabdominal pressure was elevated until it was higher than the blood pressure, the circulation through the abdomen was abolished, the abdominal viscera being found bloodless at autopsy.

What was the explanation of these findings? Suppose that the intraabdominal pressure be increased above the venous pressure, the veins would be compressed and no blood would flow through them till enough blood had been forced into them from the arteries to raise the intravenous pressure to the level of the intraabdominal pressure.

Experiments had driven him to the conclusion that the chief and essential force which propels the blood through abdominal organs was the beat of the heart. The well-known fact that pressure upon the abdomen increased the output from the inferior vena cava was not evidence against this view, because such increase was not maintained unless the circulation was greatly depressed. The absence of valves in the abdominal veins prevented any variations in intraabdominal pressure due to movements of the abdominal walls from pumping the blood toward the thorax with any great degree of efficiency, because as soon as the pressure was released there was a regurgitation. That the heart alone was capable of keeping up the abdominal circulation was proved by the experiment he had described. For in this the abdomen was distended till all movements of its walls and of the diaphragm had ceased and until the intra-thoracic pressure was positive most of the time, yet the circulation through the abdomen was maintained. In such a case no force other than the beat of the heart could be in action. The design of Nature in not providing the abdominal veins with valves would seem to be to prevent the forcing too suddenly of a dangerously large amount of blood into the thorax.

The action of venous valves and the mechanism by means of which the circulation through the legs was maintained, he showed by the following experiment: Having divided the femoral vein of a dog he tied the proximal end and attached a manometer to the distal end. At the same time he recorded the blood pressure in the carotid artery. The pressure in the femoral vein rose to the exact level of the blood pressure. When he squeezed the paw, this pressure arose to a height several times greater than the blood pressure. This experiment clearly showed that (1) the *vis a tergo* of the heart unaided could raise the venous pressure to the level of the arterial pressure and (2) that the valves in the veins of the leg formed a device by means of which every movement of the limb which compressed the veins sufficed to force blood into the abdomen. No matter how great the intraabdominal pressure might be, we could not expect venous stasis to occur in the leg, so long as the venous valves were competent,

provided there was no cardiac nor renal disease. This conclusion was in accord with clinical observation.

Since the abdominal veins were never filled to more than a part of their capacity, they must be held in a condition of partial collapse by the intraabdominal pressure. The blood in them was under this pressure. The flow through them depended upon the *vis a tergo* of the heart assisted somewhat by the negative pressure in the thorax and by rhythmical variations in the intraabdominal pressure.

Life was possible when the intraabdominal pressure had been reduced to that of the atmosphere, only when the return of blood to the heart was assisted by gravity, and when the animal was not required to make any great exertion. It was a fallacy to think the pressure upon the abdomen in cases of failure of the circulation owed its beneficial effect to compression of the arterioles and support of the vasoconstrictor mechanism. Raising the intraabdominal pressure might perhaps render some support to the vasoconstrictor apparatus but its chief beneficial effect was due to the partial obliteration of the veins and capillary vessels.

The author then considered the application of the principles just discussed to the question of the effect of laparotomy. Theoretically it might seem that the chief danger of opening the peritoneal cavity arose from the decrease of the intraabdominal pressure. But in case the incision was not a very large one, and the intestines were not allowed to protrude, the opening did not affect this pressure to a marked degree. However, if the viscera were pulled out and freely exposed the pressure became atmospheric and there was a marked stasis of blood in the abdominal veins, which withdrew a dangerously large amount of fluid from the circulation. Direct pressure by means of large pads upon the exposed viscera was sufficient to correct this trouble, and he advocated that it be employed continuously during evisceration. This means was capable of supplying the place of the normal intraabdominal pressure. In fact, it was so effective a means of returning blood to the heart that it might be at times a source of danger.

The effect of anesthesia so deep as to abolish completely the tone of the abdominal wall was to promote the accumulation of blood in the abdomen and limbs, and in his opinion not uncommonly caused a failure of the circulation during and after operation. It was fortunate that laparotomy was nearly always performed with the patient either in the horizontal or in the Trendelenburg position, for if it were usually done with the patient deeply anesthetized and in the feet down posture many more fatalities would occur. Operations both on animals and on man were much better borne under an anesthesia so light as to preserve the tone of the muscles. This was the reason why there was much less so-called shock under nitrous oxid-oxygen anesthesia than under anesthesia due to more powerful agents.

In performing exploratory laparotomy which he had recently done for gunshot wounds of the abdomen, he had several times noted on opening the abdomen what he felt certain was a great increase in the

hemorrhage from a severed intraabdominal vein. In one case in which the bullet had wounded the vena cava, there was but little blood found when the abdomen was first opened, but when he raised the transverse colon a frightful gush of blood took place. He had made similar observations in two cases of gunshot wounds of the liver.

It was well known that patients with large umbilical herniæ were liable to sudden death after operation. It had been suggested that the chief cause of this was the sudden increase in the intraabdominal pressure due to the reduction of the hernia and the closure of the defect in the abdominal wall. The author was inclined to attribute it to impeded respiration rather than to direct embarrassment of the circulation, because elevation of the intraabdominal pressure, even to a great height, did not in the absence of asphyxia cause any noteworthy increase in the general blood pressure.

The author considered next the effect upon the circulation of exposure and traumatization of the abdominal viscera. The nature of these effects was shown to every surgeon. Exposure of the intestine to the air caused it to be intensely congested and blue in color. After somewhat prolonged exposure and handling it became edematous and subperitoneal extravasations of blood occurred. Microscopic sections of exposed gut or omentum showed all the changes characteristic of acute inflammation. There was intense congestion and actual thrombosis of the veins, with margination of leukocytes, edema of the tissue and large and numerous extravasations of blood. When he took into account that the peritoneum had a surface as large as the entire cutaneous surface of the body we could form some conception of the amount of plasma and blood cells which might be withdrawn from the circulation by such changes.

In an extensive experimental investigation of surgical shock carried out in the writer's laboratory by Dr. Frank Mann, it was found that unless the abdomen be opened it was impossible to reduce a dog to a condition of shock by traumatization alone, if the anesthesia be carefully attended to and if all hemorrhages be prevented. Severe traumatization alone without laparotomy, carried out for periods from four to six hours' duration had no injurious effects upon the animal's circulation or respiration.

The phenomena of shock and of hemorrhage were practically identical, the only essential difference being that in shock there was a marked fall in the leukocyte count. This was to be accounted for on the evidence of microscopic sections of the exposed and traumatized abdominal organs, by the accumulation of leukocytes in the exposed viscera.

The conception of the nature of shock which he had just outlined might be termed conveniently the peripheral theory. It would make us combat the occurrence of shock by measures calculated to prevent the accumulation of blood in the venous side of the circulation, especially in the abdomen. In laparotomy there were three chief things to be attended to: 1. the anesthesia; 2. the posture of the patient; 3. the operative procedure.

1. With regard to the anesthesia, the depth, from our present standpoint, was the most important thing to consider. The opinion that deep anesthesia was beneficial was a fallacy. Deep anesthesia was to be avoided because it promoted stagnation of blood in the veins. The ideal depth of anesthesia was that at which the troublesome reflexes of vomiting and struggling were abolished, but at which the tonus of the muscles was well preserved. In observations on over 100 animals and on several thousand human subjects he had never observed any harmful reflex disturbance of either respiration or circulation to occur at this depth of anesthesia. Small variations in blood pressure might result from traumatic stimuli, but they were in no sense harmful and were not nearly so large as occurred almost every moment of walking life. Struggling, vomiting and asphyxia must be avoided.

2. He had pointed out in a former paper certain dangers of the Trendelenburg position. The practical conclusion therein arrived at is that this position should not be used in the presence of cyanosis or struggling, and that it should be used with caution in case the heart was diseased.

3. The peripheral theory of shock did not compel us to employ short abdominal incisions for fear of lowering the intraabdominal pressure. It rather made us use longer incisions for we kept the viscera inside the abdomen, the intraabdominal pressure was kept at a level sufficiently high for safety, and less trauma will be done with the long than with the short incision.

When the grave inflammatory changes described had taken place over large areas of peritoneum, the treatment of the condition became the same as for hemorrhage. Abdominal compression which might be conveniently accomplished by binding a pillow tightly to the abdomen was a valuable measure, since it prevented further loss of blood from the general circulation. It was powerless to restore to the circulation the plasma and blood cells already to the tissue. Direct transfusion of blood was the most efficient remedy.

SOME EXPERIMENTS DEFINING THE DANGERS OF ANESTHESIA.

DR. YANDELL HENDERSON, of New Haven, Connecticut, said he could not better express the renewed vitality of investigation in the field of anesthetics than by illustrating it with some of the recent important contributions. He took first the work of Levy, of London. The Hyderabad Commission reached the conclusion that if the administration of chloroform be pushed, it would happen 999,999 times out of 1,000,000 that respiration would fail before the heart. This amounted to saying that the fatalities under chloroform were mere carelessness on the part of the anesthetists. Naturally, the practical anesthetists who had seen patients not only breathing at the moment the pulse disappeared, but even breathing vigorously for a minute or more thereafter refused to accept such a statement.

The mistake lay in the assumption that fatalities under anesthesia must be due to excess of the anesthetic. This was an error which

had seemed extremely difficult to overcome in the minds of surgeons. They were prone to insist that "if that fool anesthetist had not poured on too much ether or chloroform, as the case might be, we should not have had all that trouble." Anesthetists, on the contrary, were usually quite ready to recognize the fallacy, for they knew, as well as anyone could, who had only a very inexact method of measuring doses, that trouble often came when less rather than more had been given.

Levy's work had shown that primary heart failure under chloroform was a perfectly definite and easily induced result of very definite conditions. He quoted cases from the literature showing that one of the essential conditions of such fatalities was light chloroform anesthesia. Such mischances did not occur under deep chloroform anesthesia, for the heart was nearly depressed and as respiration always failed first it was usually easy to effect resuscitation.

Most of the fatalities quoted by Levy occurred either during the initiation or termination of anesthesia. They involved besides the light anesthesia another factor, namely, excitement, strong sensory stimulation or an injection of adrenalin. A man was having the septum of his nose straightened. He was in excellent condition under very light anesthesia. Some adrenalin was injected and he promptly died. A girl had passed through an operation in excellent condition and the administration of chloroform had been discontinued. As she had a stiff knee, the surgeon forcibly flexed it. She gave a little cry and died. A man was given an insufficient amount of chloroform, so that the stage of excitement was prolonged; finally enough was given to induce a moderate depth of anesthesia, he suddenly became pale and pulseless. In nearly all of these and similar cases, respiration continued and was even abnormally vigorous after the pulse disappeared.

These were types of cases which Levy had shown were easily reproducible on animals, particularly cats. The author had himself seen many such fatalities unintentionally produced in animals by timid anesthetists. He had also repeated with entire success Levy's primary experiment in which adrenalin was administered to a cat, lightly chloroformed, and had obtained exactly the same sudden heart failure and complete and irrecoverable fall of arterial pressure which Levy's experiment showed.

What was it that occurred in these cases? Levy had shown by an almost excessive thoroughness of experimental demonstration, that it was a condition of fibrillation of the ventricles, *delirium cordis*, a condition which, unlike mere cardiac inhibition or vagus or asphyxial standstill, was in as large an animal in the majority of cases practically irrecoverable.

The author had tried experiments to see whether similar deaths could be produced in cats by means of adrenalin or sensory stimulation or prolonged excitement under light ether anesthesia. A certain degree of the cardiac irregularity which was a condition precedent to *delirium cordis* was thus producible, but he had never obtained a complete and fatal fibrillation of the heart by this means.

As to the subject of partial asphyxia under light anesthesia, not very long ago he had occasion to observe a difficult subject under ether. For the most part it was administered by what was called the open method, although why the term open should be applied to the type of mask employed, he was unable to see, for the patient became at times markedly cyanosed. Part of the time a frankly rebreathing method of mask and Rovsing bags were used and when too closely applied some degree of cyanosis was observed. From the Rovsing bags he obtained gas samples which were afterward analyzed for ether, CO_2 , and oxygen. The figures obtained will shortly be published. He mentioned, however, that throughout the series of analyses the oxygen content of the air in the bag and the patient's color showed the closest correspondence. Low oxygen in the inspired air occurred with cyanosis, and a fair amount of oxygen with a good pink color. It seemed to him altogether probable that if analyses had been made of the air from the open mask, the same correspondence would have been proved. If so, this mask was really far from open, for when the patient became rigid, not only was ether poured on in a steady stream, but the mask was also pressed down on the face until marked cyanosis occurred.

The time was close at hand when in every well ordered and scientific operating room, where ether was used at all, instead of it being poured as a liquid over the patient's face and into his mouth, there would be a device—and it could be a very simple device—on a stand at the anesthetist's elbow, or over in the corner, or possibly even down in the basement, in which the ether would be volatilized, and from which it would be conducted to the patient's nose and mouth, as if it were merely an unusually strong variety of nitrous oxide. That this idea was rapidly gaining recognition and acceptance was evidenced by the insufflation method of Meltzer, the simple and accurate device of the speaker's colleague Dr. J. M. Flint, and most recently by the anesthesiometer, of Connell. It was at once a simpler safer and more scientific procedure to administer the gas which we called ether vapor than it was to handle liquid ether.

Insufficient breathing was an extremely common consequence of etherization. It added to evil influences of a more or less prolonged period of insufficient oxygen supply to the other conditions lowering the patient's vitality. It was clear that the logical procedure to prevent this was some method of administering ether vapor such as Dr. Gatch showed to be so advantageous as nitrous oxide, and also some method of administering a sufficient amount of CO_2 in the air breathed after the anesthesia was ended to stimulate respiration to a more rapid elimination of the ether with which the body was saturated, and to prevent apnea or subnormal breathing, anoxemia and cyanosis.

NERVE BLOCKING.

DR. M. L. HARRIS, of Chicago, read a paper on this subject (by invitation) in which he said that it had been the aim of surgeons

from time immemorial to render painless surgical operations. It was noticed very early that if the cocain solutions were injected in close proximity to a sensory nerve trunk that the area of anesthesia was not limited to the region injected, but extended to the entire region supplied by the nerve with which the solution had come in contact. The possibility of producing anesthesia sufficiently for surgical purposes without the abolition of consciousness had been demonstrated and the desirability of the method, together with its great advantages, provided it could be freed from the dangers due to the toxicity of the substances used, at once became apparent.

The search for something less toxic than cocain led to the discovery of a number of substances which, when applied locally, produced anesthesia. Among these might be mentioned the various forms of eucaïn, tropocain, stovain, and alypin, orthoform, cycloform, novocain, etc. None of these substances possessed anesthetizing properties to the same high degree as did cocain, but they were all less toxic than cocain. Of these substances novocain seemed to be the best, as it possessed a comparatively low toxic coefficient combined with high anesthetizing properties. It was also readily soluble in water and would stand a reasonable amount of boiling without decomposition.

While experiments showed that novocain was only about one-seventh as toxic as cocain, it should not be forgotten that serious and even fatal results might follow an overdose. The amount of novocain that could be injected without producing toxic symptoms varied considerably and depended largely upon the rapidity of absorption. If a plain watery solution be used and injected in a region where absorption was rapid 0.3 gram-0.4 gram may produce symptoms, but if the solution be one which absorbed slowly 0.5 gram-1.0 gram may be used without danger. The more rapid the absorption the less marked the anesthesia, for it required a certain length of time for the drug to act. The addition of adrenalin to the solution materially increased the degree and duration of the anesthesia. Hoffman had found that the addition of one-fourth of 1 per cent. to 1 per cent. of potassium sulphate also materially increased the duration of the anesthesia, and that he was able to produce anesthesia with a much weaker solution.

The essayist had found in his own work that by the addition of calcium chlorid in varying strengths, the anesthesia might be prolonged for two or three hours without difficulty, and that a weaker solution might be used than without the calcium chlorid. The formula which he was using at present and which had given him the best results was novocain, one-fourth to 1 per cent., calcium chlorid, one-fourth to one-half of 1 per cent., chlorbutanol eight-tenths of 1 per cent. in distilled water, to which were added four to five drops of the 1 to 1000 adrenalin solution to 30 c.c. of the mixture. It was very essential that the mixture be properly prepared and that the method he used was as follows: The distilled water was sterilized by boiling. The novocain was then added and the boiling continued not to exceed two or three minutes as prolonged boiling spoiled

novocain. When this had cooled down to below 160° F., 1.0 grain of chlorbutanol was added to every 100 c.c. of the novocain solution. Water dissolved only about eight-tenths of 1 per cent. of chlorbutanol, but 1 per cent. was added merely as an easy way of insuring a saturated solution. The undissolved part simply settled at the bottom. A 2 per cent. to 4 per cent. solution of calcium chlorid in distilled water was made and sterilized, and then the chlorbutanol added the same as to the novocain solution. The solutions were kept separately and mixed just before using. In this way the percentage of the ingredients might be quickly varied to suit the particular case. The adrenalin should never be added until just before using, as it was very unstable and soon spoiled if left standing in the solution, which was indicated by the solution gradually turning a reddish color. The adrenalin solution should be comparatively fresh and if it had turned reddish in color it should not be used. The chlorbutanol was added because it had distinct anesthetizing properties of its own, and being soluble in lipoids, increased the anesthetizing effect of the novocain.

If this solution were brought in contact with the nerve it penetrated the nerve and interrupted or blocked the passage of nerve impulses at that point. If the nerve be a mixed one, afferent impulses were blocked before efferent. If the blocking was complete no afferent impulses could travel along the nerve at the point of blocking, hence no sensations having their origin in the region supplied by the nerve block could be perceived.

On making an incision through the abdominal wall, for example, it was found that the skin was the most sensitive. The subcutaneous fat was but slightly sensitive, while the muscle and parietal peritoneum were quite sensitive. He had observed several times that the patient would complain of feeling the cutting of the muscle when absolutely nothing was felt when the skin or peritoneum was cut. The complete absence of muscular rigidity and of increased abdominal tension was a certain indication that the peritoneum, where it was being handled, was anesthetized.

The uterus and ovaries were not particularly sensitive when touched, but if the infundibulo-pelvic or the broad ligament be drawn on, pain was produced which was referred to the lateral wall of the pelvis. Handling or drawing on the gall-bladder and ducts caused pain referred to the back. The appendix was absolutely insensitive, but ligating or drawing on the mesenteriolum caused a pain similar to an intestinal colic, which was referred to the region of the umbilicus with gagging, and if persisted in, vomiting might be induced. This might be prevented very readily by simply injecting the root of the mesenteriolum with the anesthetizing fluid. The same kind of a pain might be produced by drawing on the mesentery of any part of the intestine, and it was so characteristic that it might be called the intestinal pain.

As the principle of nerve blocking consisted in reaching the nerve in continuity at the most accessible point between the part to be operated on and the spinal cord, or the brain, it necessarily followed

that one should be a good anatomist in order to block successfully. One should know too the limitations of the method, although it might be said that its field was continually increasing with improved technic.

Almost any operation might be done on the lower extremities by blocking the sciatic at its exit from the pelvis or at the gluteal fold and the anterior crural at Poupart's ligament. If the operation was in the region supplied by the lesser sciatic, or the external cutaneous, these nerves likewise must be blocked. The upper extremity might be operated on by blocking the brachial plexus at the root of the neck or for operations on the forearm or hand, the nerve trunk could be easily reached in the arm. The superficial cervical plexus was blocked for operations on the neck and there was nothing more satisfactory than an operation for goiter under nerve blocking. Operations on the face, tongue and scalp could be done, and he had trephined twice, both patients expressing themselves as suffering no pain.

The complete operation for the removal of the breast and axilla could be done by blocking the brachial plexus, the acromial and clavicular branches of the superficial cervical plexus and from four to six of the intercostal nerves.

The method was ideal for hernias as the region was so easily blocked by injecting the iliohypogastric and the ilioinguinal nerves near the anterior superior spine of the ilium. One of the most satisfactory regions to block was the perineum, including everything from the sacrum behind to the symphysis in front in either sex. This region was blocked by injecting into the sacral canal.

For operations on the kidney, the eleventh and twelfth dorsal and first lumbar nerves were blocked as they escaped from the intervertebral foramina. The abdominal wall might be blocked at any point so that the cavity might be opened painlessly. Any operation within the cavity might be done which did not draw on the mesentery or other peritoneal folds or ligaments, or which did not involve the unblocked parietal peritoneum anteriorly or posteriorly. So long as the manipulations were limited to those organs which were insensitive no pain was experienced. Packing off the intestines from the pelvis or other regions necessarily drew on the mesentery and the packing came in contact with unblocked parietal peritoneum, hence pain was produced. Therefore, in operations involving the painful parts mentioned his plan was to open the cavity under nerve blocking, then give the patient a little nitrous oxid gas and oxygen during those manipulations which were known to be painful. As soon as this part of the operation was finished, the gas was discontinued and the operation completed under the nerve blocking. Following this method many of the cases received no general anesthetic, some received a little gas, and all were awake and conscious long before leaving the table and throughout a large part of the operation.

As to the advantages of nerve blocking, it was less dangerous. It would be admitted that practically all substances used for this purpose were more or less toxic, but the degree of toxicity was

comparatively well known, and as the substances were injected locally to affect nerve trunks and not used generally to affect nerve centers, it was easier to guard against an overdose. The method was devoid of dangerous and unpleasant complications which so frequently followed the use of general anesthetics, particularly ether and chloroform, such as pulmonary irritation, pneumonia, nephritis, suppression of the urine, acidosis, nausea, vomiting, headache, gaseous distention of the stomach, etc.

In the author's experience the great majority of patients preferred being conscious and looked upon the loss of consciousness as one of the greatest drawbacks to an operation. The psychic element in these cases had been greatly overestimated. The horror of an operation was based on, first, the fear of pain; second, the loss of consciousness, and, third, apprehension as to the outcome.

The author had done under nerve blocking 234 operations on 217 patients, and presented a list of cases showing the wide applicability of the method. The number of failures was six, and the number of deaths was seven. The cause of death in two cases was hyperthyroidism; in two cases uremia following prostatectomy, in one delirium tremens, in one dilatation of the stomach, and in another carcinoma of the colon.

(To be continued.)

TRANSACTIONS OF THE NEW YORK OBSTETRICAL SOCIETY.

Meeting of April 14, 1914.

The President, HOWARD C. TAYLOR, M. D., in the Chair.

DR. CHARLES G. CHILD, JR., reported a case of

PORRO'S OPERATION, WITH REMARKS ON THE UTERINE CICATRIX OF A PREVIOUS CESAREAN SECTION.

Mrs. V., aged thirty-five years, first seen on October 23, 1913, at 8 P. M., pregnant at term with her fourth child.

The histories of her former labors were as follows: The first child was difficult instrumental delivery at term, baby weighing 9 pounds, and living eight months. The second child, also a difficult instrumental delivery, weighed 10 pounds, and was born dead. The third child was born two years ago by Cesarean section, weighed 10 pounds and is living.

Her present pregnancy had been uneventful and the child was, by the usual calculations, two weeks postmature.

Abdominal Examination.—Stout abdomen, showing an old midline incision above and extending into the umbilicus. There was a small irreducible ventral hernia, very tender on manipulation. Presentation, breech, child large. Fetal heart 140, to the right of the

umbilicus. External measurements: anterior spinous 10 inches, intercrystal 11 inches, external conjugate 7 inches, estimated internal conjugate 3 1/2 inches.

Vaginal Examination.—Perineum lacerated and relaxed, cervix showed slight laceration, great deal of cicatricial tissue. External os admitted finger tip.

Indications for operation: (1) generally contracted pelvis, (2) history of previous severe obstruction in two deliveries, (3) post-mature child, (4) breech presentation. Delivery by abdominal hysterotomy was decided upon, and the patient sent to the hospital.

At 10 P. M. membranes ruptured and one hour later the regular pains began. At 12 P. M. the cervix was dilated to two fingers, with little or no softening. The breech presented, but was not engaged. Cesarean section was performed through a median line incision below the umbilicus and the patient delivered of a living male child weighing 10 1/2 pounds. Some difficulty was experienced because of the extensive adhesions between the fundus of the uterus, right adnexa and the abdominal scar of the previous Cesarean section. The uterine cicatrix showed plainly from the anterior wall of the uterus just to the right of the median line. To this there were no adhesions, but above this the fundus and the right adnexa were densely adherent to the old scar at the umbilicus.

The patient had requested and had been promised that she would be sterilized when the first Cesarean was performed, and had made a similar request before this operation. Dr. Child intended to effect a tubal sterilization at this time, but because of the dense adhesions of the uterus and right adnexa, he decided to remove the uterus.

On separating the adhesions at the umbilicus, the umbilical ring was found enlarged to 2 1/2 inches and the contents of the umbilical hernia were the right tube and a much enlarged cystic ovary. This condition had caused the patient almost continuous pain and suffering dating from the previous Cesarean section. After separating the adhesions, supravaginal removal of the uterus, left tube and right adnexa was carried out. The cervix was covered over with peritoneum, without gauze drainage through the cervix. The umbilical hernia was then repaired and the abdominal wound closed with continuous mattress sutures of silkworm-gut.

The patient made an uneventful convalescence. The sutures were removed at the end of the second week. Maximum temperature 101° F., pulse 112 on the first day. Temperature normal, pulse 88 on the third day. Out of bed on the fourteenth day.

Description of Specimen.—In the gross specimen removed from the anterior wall of the uterus there appears a depressed scar. This represents the healed incision of the previous Cesarean section, performed two years previously. It is well marked and presents to the eye a whitish band, strongly suggestive of cicatricial tissue. The sections were made through this area by Dr. MacFarland of the Polyclinic Hospital, but after examining repeated sections especially stained for fibrous tissue, he was unable to determine any more in what appears to the eye as an old cicatrix than in any other portion

of the uterine wall. Dr. Child said he was not prepared to give any explanation or reason for this, but the one advanced by Dr. MacFarland seemed to me the most plausible, namely, that when the incision was made the uterus was gravid and its muscular and fibrous structures greatly distended. When it resumed its original state the consequent contraction drew the structures in various directions, thereby greatly disturbing the relationship as it existed at the time of operation. The sections were taken through the entire substance of what is an apparent scar at right angles to the long axis and adjacent tissue at lateral margins, and we are here confronted with the anomaly of an obvious cicatrix which is microscopically non-existent.

DISCUSSION.

Dr. WM. E. STUDDIFORD referred to a case that came into Bellevue some two months ago. This patient was about six and a half months pregnant when she fell, the fall being followed by rather severe bleeding from the uterus. She went to the hospital and was kept in bed twenty-four hours, the bleeding stopped and she was allowed to go home. At that time the child was living. Fetal heart and fetal movements were felt. About a month later she came to Bellevue with a foul discharge from the vagina, no fetal movements or fetal heart were heard or felt and the woman became septic. It was impossible to deliver her because of the rigidity of the cervix which was held high above the brim of the pelvis, and the tumor which could be felt more over the left than it could to the right, it was thought feasible to make an abdominal section. She had previously two Cesarean sections performed probably for placenta previa, having been made at about seven and a half months as far as could be learned. On opening the abdomen the intestines were matted together and it was with difficulty that the peritoneal cavity was entered. Finally a decomposing fetus was isolated and removed. The fundus of the uterus was in the pelvis and the right tube and ovary were easily palpated. With a great deal of difficulty the sac was removed and then we began to get our bearings as to the case. Undoubtedly that wound in the uterine wall following her first Cesarean operation had broken down and the pregnancy had occurred in this and was really an anterior extrauterine pregnancy because there was nothing but peritoneum, omentum and intestine matted around the fetus and both tubes. She had had no symptoms until about six and a half or seven months after pregnancy began, so that in this case the scar had not healed as well as in Dr. Child's case.

Dr. WM. M. FORD said that the case that Dr. Studdiford reported came in on Dr. Flint's Service at the Manhattan Maternity about four weeks before. Where the abdominal wall was thinned out, they had no difficulty in locating the fetal heart and determining that the fetus was alive. Before the abdominal wall was thinned out they thought they could hear with ease a fetal heart underneath the abdominal skin, but the woman went home in spite of being urged to remain.

DR. F. R. OASTLER referred to a case of some interest in which a woman went through three Cesarean sections, one right after the other. She became pregnant the fourth time and before the doctor could get there she had delivered herself normally.

DR. HIRAM R. VINEBERG reported a case of

OVARIAN CYST WITH TWISTED PEDICLE COMPLICATING PREGNANCY
AT EIGHT MONTHS.

This patient was admitted to the Mount Sinai Hospital when eight months pregnant suffering from symptoms of acute intestinal obstruction. The woman was twenty-eight years of age and had been married two years; had had a miscarriage a year previously at the tenth week and was now in the eighth month of pregnancy. There was a moderate degree of vomiting present in the early months, and more recently, two or three attacks of vomiting and constipation. At this time a mass was noted in the left iliac region, which, together with the symptoms would disappear after catharsis. For the two months prior to admission she had been fairly well until the present attack, which came three days before admission to the hospital and was marked by incessant vomiting, pain in the left side of the abdomen, and very pronounced constipation. Vomitus was of a green color without fecal odor. The temperature on admission was 100° F., pulse 88, respirations 24. The patient seemed to be very ill, the face had an anxious look, the eyes were sunken, the tongue dry and coated, the vomiting was almost incessant and very distressing. The fundus was near the ensiform and fetal movements could easily be made out. On the left side of the abdomen on a line with the umbilicus, an indefinite mass could be palpated, over which the percussion note was dull. It was tender and there was moderate rigidity of the overlying muscles. The urine was free from albumen and the blood pressure 135. A diagnosis of ovarian cyst with a twisted pedicle was made and the patient immediately prepared for operation. An incision was made through the left rectus muscle with its midpoint opposite the umbilicus. Exploration showed the greater portion of the tumor which was the size of a fetal head wedged in between the gravid uterus and the wall of the abdomen. It was delivered with difficulty and during the manipulations one of the multilocular cysts ruptured and permitted a clear brownish-black fluid to escape. The pedicle was twisted two and one-half turns, and was very much infiltrated with blood. A moderate amount of sero-sanguineous fluid was present in the peritoneal cavity but no attempt was made to remove this. The abdominal incision was closed with layer sutures of catgut and four stay sutures of silkworm-gut were passed through the skin, fascia and muscle. Two days later the patient delivered herself of a child weighing 5 1/2 pounds with about four hours of labor. The vomiting persisted for about two days longer but after this the patient made an uneventful recovery and the wound healed by primary union. She was discharged twenty-four days after operation with a healthy living child.

Dr. Vineberg did not consider Cesarean section in this case, believing that a carefully sutured wound would safely stand the strain of labor.

DR. HIRAM N. VINEBERG presented a

PRELIMINARY REPORT OF AN OPERATION FOR GENERAL ENTEROPTOSIS.*

DR. DOUGAL BISSELL presented

A CONTRIBUTION TO THE STUDY OF MOVABLE RETRODISPLACEMENTS OF THE UTERUS, THEIR ETIOLOGY AND SURGICAL TREATMENT.

After referring to the two types of retrodisplacements of the uterus which may be classified as virginal and maternal, Dr. Bissell referred to the necessity of intelligently considering the normal position of the uterus, its range of motion, supports and anatomical relationships, before studying the etiology of retrodisplacements. Although anteversion is taught to be the normal position of the uterus, there seems to be a diversity of impressions in the minds of students as to the position of the uterus which may be considered a standard. Drawings of the anatomists are the results of observations on the dead and the surgeon usually constructs his illustrations from these. A correct idea of the normal relationships of the pelvic organs in the living can be obtained only from the living subject and opportunity for the study of these relationships is best afforded during intra-abdominal work directed to lesions not involving, or if so only in a minor way, the organs under consideration. Dr. Bissell described in detail the physics of the uterus in its relation to the pelvic contents, especially as regards the variable influence of the bladder and rectum. He summarized his paper by stating that the ability of the pelvic fascial diaphragm to restore and maintain the uterus in the extreme anterior or posterior position is the key to the discussion on movable retrodisplacements. So long as the uterus is in the standard position all forces directed from above upon it and its adjacent structures are shared equally by the group of tissues constituting the fascial diaphragm, but as the corpus recedes the distribution of the forces becomes more and more unequal and the liability to permanent loss of equilibrium is greater and greater. Nature has provided the round, broad and uterosacral ligaments as additional safeguards to be called upon when the loss of equilibrium is threatened.

Any factor or combination of factors, congenital or acquired, which discourages the resumption or maintenance of the uterus in standard position, encourages an unequal distribution of the forces expended on the fascial diaphragm with retrodisplacement as the eventual result.

DR. AUSTIN FLINT, JR., read a paper on

RETRODISPLACEMENTS OF THE UTERUS FOLLOWING CONFINEMENT.†

* For original article see page 16.

† For original article see page 1.

TRANSACTIONS OF THE SECTION ON GYNE-
COLOGY AND OBSTETRICS OF THE MEDI-
CAL SOCIETY OF THE STATE OF
NEW YORK.

ANNUAL MEETING, NEW YORK CITY, *April 28-30, 1914.*

Chairman, ROSS MCPHERSON, M. D., *of New York.*
Secretary, H. HUDSON LIPES, M. D., *of Albany.*

Session of April 28.

DR. J. RIDDLE GOFFE, of New York, presented a paper on

THE ETIOLOGICAL FACTORS ENTERING INTO THE CONDITION OF
EXTREME PROCIDENTIA WITH RECTOCELE AND CYSTOCELE
AND THE OPERATION FOR REPAIR.

DR. GOFFE said that in all plastic operations the object should be reconstruction of anatomic structure and restoration of physiologic function. Heretofore attention has been centered almost wholly upon the floor of the pelvis as the exclusive support of the contents of the female pelvis. To-day we are lifting our eyes above this restricted view and find in the control of intraabdominal pressure the secret of the support of the pelvic organs. Intraabdominal pressure may be defined as a pressure in the abdomen due to atmospheric pressure, to gravity, to muscular contraction of its wall and to intravisceral distention such as a full stomach, intestine, bladder, etc. The intensity of intraabdominal pressure at any time and place is the resultant of all these forces working together at the specified place and time. Anything that tends to diminish the capacity of the abdominal cavity increases intraabdominal pressure. The simplest illustration of this is the contraction of the diaphragm in respiration. This force applied in the attic of the abdomen like all force tends to transmit itself in straight lines. What is not reflected in other directions and absorbed appears in the pelvis and impinges upon the posterior or upper face of the uterus and broad ligaments, due to the fact that intraabdominal pressure starting at any point whatsoever is reflected from various planes of surface at varying angles and is transmitted through tissues of varying density, rendering it a very complex force. It must not be forgotten however that the pelvic cavity is simply an extension of the abdominal cavity and participates in every variation of intraabdominal pressure.

In the pelvis are present two distinct reflecting and deflecting planes of tissue disposed somewhat parallel to each other: First, the uterus with its broad ligaments reflected across the pelvis from side to side and second, the floor of the pelvis. There are two conditions under which intraabdominal acts are revealed in the pelvis, first when the patient is making great physical effort, as in lifting heavy weights, and second, when straining at stool, or assisting in parturition or in micturition. In lifting heavy weights not only are the abdominal muscles under firm contraction to hold the trunk of the body rigid, to give a fixed resisting point from which the arms and legs may act, but the muscles in the floor of the pelvis likewise contract firmly to assist in this condition of a rigid trunk. The intraabdominal pressure exerts itself most directly on the posterior, actually the superior face of the uterus and its broad ligaments. This plane of tissue is thereby forced down to a lower level in the pelvis till its progress is interrupted by the resistance of its ligaments. At the same time the contraction of the pelvic floor as just described elevates the crest of the perineum to a sufficient degree to assist in the support of the uterus. If, however, support of the pelvic floor has been impaired by laceration, intraabdominal pressure upon the face of the uterus and the broad ligaments overcomes the resistance of the ligaments to such a degree that the uterus is carried into the axis of the outlet of the pelvis and gradually forced out of the body. In the second condition, *i.e.*, when the bowel, the uterus or the bladder is to be emptied through an automatic reflex cooperative process, the floor of the pelvis does not contract simultaneously with the abdominal muscles, the levators and indeed all the muscles of the pelvic floor relax to assist in this process and the pelvic organs are thrown back for support almost exclusively upon their ligaments. The internal resisting plane of tissue is carried down to an extreme degree. The fundus of the uterus meets with opposition in its descent more completely than the cervix. The point of attachment of the cardinal ligaments sweeping across the pelvis from side to side in the base of the broad ligaments act as a fulcrum and the intraabdominal pressure continuing to act upon the cervix carries the cervical end of the lever down to a still more extreme degree thus tilting the fundus up. The resisting plane of tissue presents therefore a different angle to the impingement of intraabdominal pressure thereby reflecting and deflecting it back into the axis of the pelvic outlet where it expends itself in emptying the rectum, the bladder or the uterus.

If, however, the intraabdominal pressure becomes too great for the resistance of the ligaments the uterus may be tilted to such a degree that intraabdominal pressure may impinge upon the anterior face of the uterus carrying it over into a position of retroversion. Here it receives all the expulsive force exerted in the axis of the pelvic outlet and is carried rapidly down into a position of prolapsus or even procidentia with its accompanying complications of rectocele and cystocele.

If this is the true picture of the dynamics of these processes, we are brought to the inevitable conclusion that much if not the majority

of the sustaining force of the uterus resides in its ligaments and the uterus is supported from above. This is in accordance with Nature's recognized plan of holding organs in place by suspension from above. All anatomists recognize this fact even in describing the supports of the pelvic organs. Unfortunately the fathers of gynecology so emphasized the floor of the pelvis as the support of the pelvic organs that it has taken the succeeding generations of gynecologists a long time to lift their eyes from the floor of the pelvis and recognize the part played by supports from above.

The degrees of prolapsus or procidentia vary from the slight appearance of the cervix at the introitus vaginæ with the base of the bladder pouting above it and rectum below, to the extreme degree of complete eversion of the vagina carrying with it the uterus, rectum and bladder and its elongation to an extent that permits the uterus hang down almost to the knees with large inflamed patches of denuded mucous membrane on cervix and vagina.

In dealing surgically with this condition three distinct procedures are required: First, relief of the procident uterus; second, treatment of the cystocele, and third, control of the rectocele. In determining the kind of operation all cases may be divided into two classes, first, when the patient is in the child-bearing period, and second, when she is at or past the menopause. In the operation devised by Dr. Goffe the underlying motive is to restore not only anatomic structure but also physiologic function. This is done with the idea kept prominently in view of reconstructing the normal anatomical arrangement and thereby reestablishing the important function of the uterus and broad ligaments as a deflecting plane of intraabdominal pressure.

In dealing with the cystocele the effort is to observe with scrupulous care also the anatomy, function and topography of the bladder. In the first place the bladder is located normally on the anterior face of the uterus, never on its posterior face; secondly, the bladder has a fixed portion called the trigone through which the ureters pass into the bladder, this takes no part in the expansion or traction of the bladder. The dome or upper part of the bladder is the portion that expands and contracts. In expanding and contracting this portion moves on the lower or fixed portion along definite lines of demarcation which Kelly calls hinges. The posterior lines or fold stretches from side to side in front of the ureters. It follows the contour of the uterus and ends in front of each broad ligament where two lateral folds begin and extend horizontally around toward the urethra. The apices where the posterior fold joins the lateral folds are called by Kelly the right and left cornua. These are fixed points of support.

Dr. Goffe's operation restores with accuracy this anatomic arrangement. The trigone of the bladder is spread out and made fast to the anterior face of the uterus and broad ligaments by carrying the face of the bladder up and stitching it at three points: One stitch at each cornua and one at the median line at the center of the

anterior face of the uterus. The uterovesical peritoneal fold is restored as well as the hinges, on which the dome of the bladder moves in its function of receiving and discharging the urine.

In the restoration of the floor of the pelvis Dr. Goffe uses the method of distinct isolation and mobilization of the levator ani muscles and stitches them together with buried sutures. The muscles are thereby freed from cicatricial attachments which distract and limit their function and seem to make a new clean sheath for themselves.

In extreme rectocele the vaginal mucous membrane is stripped off from the entire anterior wall of the rectum from the line of the peritoneal covering at the bottom of Douglas' culdesac down to the fourchette. The wall of the rectum is then plicated with buried catgut sutures. This is done in such a way as to secure to the rectum the support of the pelvis as follows: Beginning by a firm grasp on the strong connective tissue at the side of the rectum in Douglas, pouch a continuous suture of chromic catgut No. 2, is passed up and down in the direction of its longitudinal axis across the face of the rectum to the opposite side where it terminates in a strong bite upon the corresponding connective tissue. As much as an inch or an inch and a half of rectal wall may be taken up in this suture, when necessary a second or even third tuck may be thus taken in the rectal wall. In front of this I stitch together the levator ani muscles with their fascia and accompanying tissue.

In the second class of cases, that is, in patients at, near, or beyond the menopause, Dr. Goffe's effort has been to retain as nearly as possible all these physiological functions following the plan as already described. Unless there is positive objection on the part of the patient the uterus is removed per vaginam. In order to restore the deflecting plane of tissue the broad ligaments are stitched together across the pelvis from the infundibulopelvic and round ligaments down to cardinal ligaments. In this procedure a plane of tissue is restored in exactly the same situation and under control of the same ligaments as under normal conditions. This deflects from its posterior surface back into the pelvic outlet, the intraabdominal pressure, and thus physiologically takes the place of the original structures. On its anterior face it also affords a surface on which to spread out and fix the trigone of the bladder, restoring its hinges and all its physiological functions. The floor of the pelvis is restored in the usual manner.

The operation is done as follows: First the uterus is curetted, and trachelorrhaphy or amputation of the cervix performed. A transverse incision through the vaginal wall is now made in front of the cervix, and through this the bladder is dissected from the uterus up to the peritoneal reflection. The peritoneal cavity is then entered and the peritoneum at the line of the reflection is torn across widely from side to side out onto the broad ligaments. The next step consists in dissecting the bladder from the vaginal wall. This is speedily and easily done by means of a dull dissector or the end of a blunt-pointed scissors, the dissection extending to the

urethra and reaching out to the limits of the bladder on either side; the bladder is thus set entirely free from all its inferior attachments. An incision is then made through the vaginal wall throughout its entire length from the middle of the transverse incision up to the urethra. With an anterior retractor the bladder and vaginal flaps are lifted up behind the symphysis, and the fundus uteri turned down into the vagina. This brings the appendages into view and within reach where they can be treated surgically if necessary. The uterosacral ligaments are then shortened, and then the round ligaments by doubling them on themselves and the loop made fast to the uterus at the anterior origin of the round ligaments. Three Pagenstecher linen ligatures, are now passed, one through the anterior wall of the uterus at its middle point and the other two through the anterior walls of the broad ligaments, just outside of the lateral margins of the uterus. These are left long and protrude through the vulva. The fundus of the uterus is then lifted and the bladder brought down into normal position. A point is now selected in the base of the bladder, at such a distance from the urethra as when carried up to the point of insertion of the first of these three ligatures, will cause the base of the bladder to make a straight line from the urethra to the uterus. It is really the upper edge of the fascia lata as it sweeps across from side to side. Through this the suture is passed, catching up in its course the bladder attachment of the peritoneum, where it was torn from the uterus. Two points in the base of the bladder are now selected, at either side of the first selected point and distant from an inch to an inch and a half. Through these points the lateral sutures are passed respectively. The three are then tied, beginning with the middle one. The first one takes up all the slack in the line from the uterus to the urethra, but makes a ridge in the interior of the bladder with a sulcus on either side. By tying the lateral sutures, however, these sulci are obliterated, and the base of the bladder is spread out upon the anterior face of the uterus and broad ligaments.

The overstretched fascia and wall in the anterior vagina is now cut away to such a degree on either side of the median line as when stitched together will make it fit snugly under the base of the bladder. This relieves the hernia and restores the support which the bladder receives from the fascia lata on either side. The vagina is then stitched to the uterus at points that will smooth out the vaginal wall, but will not shorten it to a degree that will cause it to pull on the cervix. The transverse incision in the vagina is closed with a running suture. The floor of the pelvis is reconstructed in accordance with the method described by Dr. Sturmdorf. The vagina is loosely packed with gauze and the operation thus completed.

The patients of the second class are found in elderly women who have borne many children. These are the severest and most unmanageable cases. In the treatment of them we have the most complicated problems and the greatest mechanical difficulties. The principles of the operation are the same here as in minor cases, but their application is slightly different. Nor only have the tissues in

the pelvis lost their tone, they are atrophic, thin, friable, and therefore useless as supports. In these cases my rule is to remove the uterus by vaginal hysterectomy. In order to provide a support for the bladder and also a surface to act as a deflector of intraabdominal pressure, the broad ligaments are stitched together from the round ligaments down to their bases, taking in sufficient slack to make them draw taut across the pelvis. Upon this plane of tissue Dr. Goffe then proceeds to spread out and make fast the base of the bladder, following the same technic as in the previous cases. The anterior wall of the vagina is cut away as before, its edges are stitched together, and the upper end is fastened to the broad ligaments. In addition to the restoration of the levator ani muscle, in dealing with the floor of the pelvis in cases of extreme rectocele, he has inaugurated the plan of plicating the rectum upon itself by inserting a line of buried sutures across the anterior wall, passing the stitches parallel to the longitudinal axis of the rectum. In some instances he passed two or three lines of such sutures, going up onto the peritoneal covering. This naturally necessitates extensive denudation of the rectum. The floor of the pelvis is then restored and colporrhaphy done throughout the entire length of the posterior vaginal wall.

RESULTS.

As regards the final results, Dr. Goffe stated that he had been doing these operations during the past nine years. In two instances, before he began the plication of the rectum, a high rectocele came down over the perineum and presented at the vulva. This led to his practice of plication, and there was no longer any trouble from this source. In no instance has the uterus or bladder failed to remain in satisfactory position.

DISCUSSION.

DR. ARNOLD STURMDORF, New York.—Dr. Goffe has visualized for us, not only his successful solution of the most intricate and hitherto baffling problem that confronts the gynecologist, but also the highly specialized skill and judgment that is essential to restore the anatomic, physiologic and dynamic factors that are correlated in maintaining the topographic stability of the female pelvic organs.

For years, we were dominated by the conception, that visceral support was simply a question of adequate fascial and ligamentous resistance to displacement, and all of our standardized corrective operations resulted in nothing more or less than either the creation of an obstructive cicatricial barrier at the pelvic outlet, or an abnormal fixation and transposition of the pelvic viscera, or both.

To-day, we know that fascial and ligamentous resistance is only one element in a complicated mechanism, that counteracts the expulsive force of intraabdominal pressures by deflecting the direction of that pressure toward normal outlets.

The function of the ligaments, while of great importance, is

purely passive in that they limit the essential mobility of the pelvic viscera to a normal range.

The ligament is not created that could permanently withstand, by its structural resistance, as such, the continuous force of intra-abdominal pressure.

The very arrangement of the ligaments precludes a suspensory function, for with the single exception of the sacro-uterine, every pelvic ligament is anchored to a level below that of its uterine attachment, sloping downward like the stay ropes of a ship's mast, and the resistance of the sacro-uterine is so variable that it can hardly be taken into serious consideration, while the bladder has no ligaments except in the pictures of text-books.

The pelvic floor, with its superposed viscera, rises and falls with every respiratory movement, and is forcibly depressed with every expulsive effort, as in coughing, straining, and so forth.

The rebound necessary to restore and maintain a mean normal level, cannot be physiologically effected by any tissue resiliency, but must be induced by muscular contractility, and this contractility is exercised by the levator ani muscle.

I have gone at length into the dynamics of this muscle in my previous publications on the subject, and will limit myself here to corroborative facts only of a clinical nature.

It is recognized clinically that in disease of the lower spinal cord segments involving the fourth sacral nerve, a prolapse of the pelvic viscera ensues as the result of levator paralysis, and this, notwithstanding that the ligaments are all intact and competent.

Apparently opposed to this, stands the experience that, when the levator ani is completely severed by perineal laceration, extending through the sphincter, prolapse rarely ensues. The explanation for this apparent paradox is very simple. In abdominal pressure we must recognize an active and passive phase.

The passive phase is that state of balanced intraabdominal tension which prevails in the ordinary conditions of functional activity—this phase does not concern us here.

The active phase is induced by that state of intraabdominal hypertension; which results from every augmented effort that calls the abdominal and respiratory muscles into sudden or sustained contraction, *i.e.*, coughing, sneezing, vomiting, straining at stool, lifting, and so forth. It is this phase of abdominal pressure which, undeflected, extrudes the pelvic viscera and their contents in the direction of least resistance.

The anal sphincter, under normal conditions, is the pressure valve of the pelvis at the intestinal outlet; tear it and any sudden augmentation of intraabdominal pressure is promptly released and reduced by the expulsion of flatus through the gaping anal orifice, before the increased pressure has had time or accumulated sufficient force to extrude the pelvic viscera.

I would not create the impression that I underestimate the very essential function of the ligaments and fascia, nor the absolute necessity for their restoration, as detailed by Dr. Goffe.

We cannot cure a prociidentia by any operation limited to the levator ani muscle, but we court positive failure by omitting the restoration of the levator ani.

These procedures are mutually complemental. We must realize that while we restore the prolapsed viscera to their normal level by our work on the ligaments and fascia, we cannot secure their permanent retention at that level unless we redirect the displacing force of intraabdominal pressure, and this can be accomplished only by the complete mobilization and correct repair of the levator ani muscle.

The deflecting plane of the pelvic viscera, is not a fixed but a movable plane, and the levator ani is its motorial factor, it is the mainspring of the whole deflecting apparatus. Its dynamic energy ranges from 10 to 27 traction pounds. Its contraction diminishes the force of intraabdominal pressure upon the pelvic viscera by deflecting the direction of that pressure; it augments the resistance to that pressure, by closing the uterovaginal angle, and opposes the pelvic outlet to the pressure, by compressing the vaginal canal.

When we realize that, to many, the denuded levator ani is still a "terra incognita," the reason for my emphasis of its importance becomes apparent. I venture to prophesy that when all is said and done, and when everyone has added his modicum of comment and modification, and affixed his name to the procedure by virtue of that modicum of change, the successful operation for the cure of prociidentia will be based upon the principles and on the principles elaborated by Dr. Goffe.

DR. GEORGE G. WARD, JR., New York.—"One day some years ago, before his operation for cystocele and prolapse was well known, it was my good fortune to meet Dr. Goffe, and while talking it over with him, he asked me to come and assist him at one of his operations for cystocele. I have always thought that that was a very profitable afternoon, for the reason that I was thus able to appreciate the essential points necessary in order to separate the bladder properly from the vagina and the uterus, and to replace it higher up in the pelvis where it came from. The cure of cystocele is not a simple proposition. A cystocele operation, as it is done to-day, treats this condition as a true hernia of the organ. The older operators were contented with a simple denudation of the mucous membrane covering the anterior vaginal wall, and then by placing a puckering suture, as in the "Stoltz" operation, or by inserting the suture from side to side, they drew the cut edges of the denudation together, and this apparently got rid of the cystocele, so far as the vagina was concerned; but, what of the bladder? The bladder naturally was thrown into folds behind the suture, only to be stretched out again as time went on, and we know that they relied on the restoration of the pelvic floor as the essential cure for the cystocele, after all.

Now you might just as well try to cure an inguinal hernia by sewing together the pillars of the external ring, and think because it looked very nice that you would cure the hernia. but as we well know something more radical is necessary."

"This modern operation for cystocele as worked out originally by Hadra of Texas. I think in 1889, and by Sanger, in 1892 (these are the men who I believe really called the profession's attention to the proper way to treat this thing)—is based on the fact that it is regarded as a true hernia and starting with the proposition that you must separate the bladder completely from the anterior vaginal wall and uterus and place it higher in the pelvis from whence it came, in addition to restoring the pelvic floor in order to get a permanent cure. That is what Dr. Goffe's operation does, better than the other operations which are based on the same principle, for the reason that it is more radical, and, that is to say, more thorough."

"The cystocele of the condition of complete prolapse, which we are considering here, is but a later stage of a moderate degree of cystocele. The crux of the whole difficulty in complete prolapse is not the uterus. We can cut that away without any trouble whatsoever, but to replace the bladder and to permanently hold it in the pelvis is another thing altogether. If this principle for the cure of a moderate degree of cystocele is correct, the same principle must necessarily apply in the more extensive cystocele present in complete prolapse. To cure it we must separate the bladder completely from the anterior vaginal wall and uterus and fasten it higher up in the pelvis. The natural supports are the broad ligaments, especially at their base, with aid from the uterosacral and the muscular round ligaments. After you have removed the troublesome uterus and sutured the broad ligaments together and reinforced them with the uterosacral and round ligaments, you have something substantial to suture the bladder to; and in that way Dr. Goffe restores the bladder by spreading it out on the face of the broad ligaments, as he has shown you in his illustrations here. The vagina is reduced in its size by trimming and reattaching it to the base of the broad ligaments and the pelvic floor, then the operation is done."

"I have had considerable experience with this operation of Dr. Goffe's and I think with satisfaction to my patients. I showed a case at the Academy of Medicine the other night, with the result after several years and I am quite sure those gentlemen who examined that case—and some of them I see here tonight—will bear me out that you could hardly tell the the woman had borne a child and you could not tell that there was anything abnormal other than that the uterus was gone. That was simply one case and I have had a number of results nearly as good as that."

"There is one point I would like to call attention to, that what we have said about the cystocele is equally true of the rectocele, though perhaps not quite to the same extent, as the rectocele is not the crux of the difficulty as is the cystocele but it is a troublesome factor just the same. If what we say is true about the cystocele, we should apply the same principle for the cure of the rectocele. It is a true hernia of the rectum, which is pouched and enlarged as is the posterior vaginal wall and rolls out with it out of the relaxed pelvic outlet. Instead of doing the operation the old-fashioned way of

denuding the vaginal surface of this rectocele and suturing the cut edges of the vagina together; we should apply the same principle here, I believe, as in the case of the bladder—that is, to separate the rectum from the posterior vaginal wall up to the region of the cervix so that it is completely loosened, just as Dr. Goffe does in his bladder operation. Then the rectal pouch can be shifted to a position higher up in the pelvis, to that part of the vagina above the dilated portion and from which it will receive firm support. Therefore I add to Dr. Goffe's operation, this operation which I call a "recto-pexy." After separating the vagina from the rectum, a suture is passed through the posterior vaginal wall in the middle line near the cervix and it is brought down and after catching the dilated pouch of the rectum is carried up and through the posterior vaginal wall near its insertion so that when drawn tight it slides the rectal pouch to the upper end of the vagina. I then cut away the excess of the posterior vaginal wall which is overstretched and suture the cut edges together. I complete the operation on the pelvic floor with a procedure similar in principle to that described by Dr. Sturmdorf. I isolate the levator ani muscles and suture them together, why?—because they are overstretched and need to be reefed. The Emmet operation takes care of the fascia of the sulcus and is sufficient in a moderate injury but it does not do enough for a bad case. We need to do more. We need to reef these stretched muscles and the operation of dissecting them out, whether you do it the way Dr. Sturmdorf does, or by making a buttonhole, as I have done for a number of years, and suturing them together, lifts up the pelvic floor."

"An analogous condition exists in the pelvic floor as is present in the mouth. You have a fixed upper jaw and you have a movable lower jaw. You have a transverse slit in the mouth and you have the masseter muscles similar in action to the levator. If you cut or overstretch the masseter muscles the lower jaw would hang open all the time and it would be necessary to reef or repair those muscles to bring it up to its proper position. So, therefore, I believe this is a better operation to do in extreme cases."

DR. S. W. BANDLER, New York.—"We are very much indebted to Dr. Goffe for teaching us that an essential to the cure in these cases of cystocele is the complete and absolute separation of the bladder. When the bladder is completely separated, it shrinks up to one-third of its size, and you can practically hold it in your hand. What becomes of that bladder afterward, depends on what you do to it, or where you place it."

"Before going on with this question, I want to say that in the operations for total prolapse, I do the levator ani union so very well pictured in Dr. Ward's drawings; and when these levator ani muscles are united, the thought in my mind is that the hernia of the rectum is absolutely shut off from the vagina; not the thought that there is a change in the pelvic planes that subsequently affects the position of the intraabdominal organs. Not that I do not believe in the principle of pressure and so on, which has been shown or initiated by Dr. Goffe and Dr. Sturmdorff, but I believe they are factors of

little importance. The position of the uterus depends upon the position of the cervix. If the cervix is high up and far back, then this intraabdominal pressure will keep the uterine fundus anterior, and the uterus horizontal when the woman is standing. After she has had one or more children, or if there is an atrophy or some trouble with the pelvic fascia, which includes the ligaments, the cervix comes down, and no matter what the intraabdominal pressure may be, unless the patient has unusually strong round ligaments the fundus will fall back. If the cervix comes down the fundus is bound to go back, so that retroversion is the first step in a descent. Then the intraabdominal pressure comes into play and if the uterus is already retroverted, and other factors complicate, then a gradual descent ensues and a prolapse results. So that, while we should pay attention to the intraabdominal pressure angles, I believe that this is a point which is liable to take our attention away from the real factors at fault."

(Dr. Bandler then illustrated his discussion with blackboard drawings showing the manner in which the suturing was done.)

DR. J. RIDDLE GOFFE, New York.—"In dealing with a rectocele, especially when it is extensive, I dissect off the posterior wall of the vagina the full width of the rectum clear up to the peritoneum where it is reflected to form Douglas' pouch. The excess of rectal wall forming the rectocele is now plicated. With a perfectly denuded rectum entirely stripped of its vaginal covering, a suture of chromic gut No. 2, is inserted into the pelvic fascia at the side of the rectum as a basis of support. As a continuous suture this is then inserted into the rectal wall in the direction of its longitudinal axis, reaching down for a distance of $1\frac{1}{2}$ to 2 inches. It is then carried back to a point in the rectal wall on a level with the first point of insertion. The tissue is picked up here, sometimes catching the edge of the peritoneum where it is torn across on the face of the rectum and then inserted again opposite the lowest point picked up by the first suture. It is carried thus up and down the rectum till the other side is reached where it is inserted into the pelvic fascia and securely tied. Sometimes a second suture is similarly passed below this. The only trouble I have had at all in this operation was when I first began. I had some rectoceles that came down and pouched over the top of the peritoneum but since I have adopted this method of plicating the rectum I have had no trouble whatever. These plications act as folds or valves in the rectum which are entirely normal through that viscus where they help to hold the fecal matter; so that we can put in here, two and sometimes three sutures, running across the face of the rectum and plicating it up and down this way, making it fast to the cellular tissue on either side, and I have never had any trouble with the rectum since adopting this plan."

DR. WILLIS E. FORD, of Utica, read a paper on

STERILITY IN WOMEN.

In speaking of the failure of science to solve the problem of sterility in women Dr. Ford briefly reviewed the various operations

that have been instituted for the relief of sterility and dysmenorrhea; and stated in conclusion that there is very little reliance to be placed upon statistics which from time to time are furnished, with respect to any one of the theories advanced. This is true because in one community, and especially in large hospital clinics, the proportion of those women who are infected, or who have practised illegitimate means for the prevention of pregnancy, is greater than is found in rural districts, and among the better class of people.

Again, while the younger men who are practising medicine may see a larger number of cases that desire to prevent pregnancy, the older men, with established reputations for skill, are likely to be consulted by a larger number of women who earnestly desire pregnancy and who are living perfectly wholesome lives.

Thus Dr. Ford's own views regarding this problem have changed within the past few years, until he now believes there is a small number of cases of women who have undeveloped uteri, or undeveloped cervixes, that ought to be relieved by the Pozzi operation.

These conditions of dysmenorrhea or persistent leucorrhœa, dependent upon imperfect drainage, develop many cases of tubal disease in otherwise normally constructed women.

Pozzi's operation consists in making an anterior and posterior lip by cross-section, and by covering in the raw surfaces by making a groove in each raw surface, and allowing the membrane to cover in the cut surface, which is an essential feature of the operation.

The whole point is to avoid any scar tissue.

He reported thirty-three cases and believes that the results, both in relieving the dysmenorrhea, and preventing more serious trouble later in life, make this operation worth while in young women.

A few perfectly normal cases, excepting for the condition of the cervix, where marriage has existed for several years, and after operation normal pregnancy has occurred, were reported.

The prevention of morbid conditions about the uterus, and the prevention of sterility by the Pozzi operation, carefully done and securing permanent drainage, was his aim in this paper.

He spoke of the possibility of a physiologic tumescence of glandular tissue, either as the result of menstrual congestion or of sexual impulses, as sufficient cause for sterility in many cases.

DR. JOHN G. CLARK, of Philadelphia, presented a paper on

PATHOLOGY AND TREATMENT OF GONORRHEAL CERVICITIS AND ENDOMETRITIS.

(This paper will be published in full in the Transactions of the Philadelphia Obstetrical Society in another number of this Journal.)

DISCUSSION.

DR. ROBERT T. FRANK, New York.—Dr. Clark has considered the subject from the viewpoint of physiology, pathology, and clinical manifestations.

Physiology shows why in some cases, with each menstrual period a reinfection takes place.

The newer pathology saves the clinician from misleading reports, because the monthly change in the endometrium is no longer mistaken for "endometritis." Chronic inflammatory changes may, however, escape detection because plasma cells disappear early in the disease, and the ordinary cellular infiltration is hidden by the stroma cells, unless the change is well marked and localized.

Clinically, Dr. Clark is ultraconservative, I am pleased to see, and yet, while rigidly limiting the cases for local treatment to chronic conditions in which reinfection from the husband and tubal disease can be excluded, he runs a risk in advising the profession to employ this measure. In his hands such treatment may be fairly safe; in that of the profession at large it will prove as dangerous and harmful as the curet.

The discharge comes from the cervix; even when the endometrium is diseased, its secretion is minimal. No one, even with the aid of an anesthetic, can hope in every case to diagnose milder types of salpingitis, which may be of sufficient virulence to keep up the endometritis, and to produce attacks of pelvic peritonitis, if stirred up by intrauterine treatment. The uterine cavity is better able to overcome an infection than the Bartholinian glands, Skene's ducts, and the cervical crypts, which are within reach, or the tubes, which cannot be attacked except through the peritoneal cavity.

Our hopes for the future should be based upon an efficient vaccine or serological treatment, which should prove applicable not only to a few selected chronic cases, but also to the enormous number of acute and subacute sufferers from the disease, curing them before irreparable damage to the genitalia has occurred.

DR. HENRY C. COE, of New York, read a paper on

METRORRHAGIA AT PUBERTY.

Dr. Coe referred to the fact that the surgical side of gynecology had been cultivated in this country at the expense of the scientific. More interest was taken in modifications in the technic of an operation than in research work, which is really the basis of modern surgery. The impression seemed to prevail among the profession that gynecology as a specialty was in a state of permanent crystallization, few facts remaining to be verified or new discoveries to be made. That this was erroneous was shown by our lack of exact knowledge with regard to the etiology of some of the common phenomena relating to the pelvic organs. Hemorrhage was probably the most significant of all, more so even than pain, which was subjective and not easily verified, since it may be the only indication of serious pelvic disease. The writer said he had no intention of dealing with the familiar gross conditions of which this is a sign, and which are described in every text-book, with details as to medical and surgical treatment, but would call attention to a single, quite limited, class

of cases of peculiar interest to the family physician, as well as to the specialist.

Strange to say, the important subject of menorrhagia and metrorrhagia at puberty had attracted comparatively little attention among us, though it had been carefully studied abroad, notably in France. One need only refer to a Paris thesis (Hours, 1906), with its copious bibliography. This was published eight years ago. Since that time Dr. Sturmdorf, of this city, had done praiseworthy original work along this line which is a source of pride to his confrères. Even in children of twelve or thirteen, local lesions were occasionally found, sufficient to explain menstrual irregularities, such as uterine polypi, ovarian cysts and congenital malpositions, while certain general diseases and dyscrasia had frequently been noted as causes of metrorrhagia. The writer confined himself to cases in which no satisfactory explanation of the symptom could be given, unless it could be referred to some obscure "hypo- or hyperplasia" of glandular origin which could not be demonstrated clinically.

Two typical cases were reported, both patients being apparently in perfect health, without local pain, or palpable evidence of uterine or ovarian trouble. In one, menstruation first appeared at twelve and a half years, was at first slight and irregular, but later became profuse and finally more or less continuous. After a prolonged course of medication, curetment was resorted to, with temporary benefit. A year later the girl died suddenly of pulmonary embolus and moderate cystic degeneration of the ovaries was the only abnormality found in the pelvis on autopsy. The ovaries could not be palpated at the time of operation.

The other patient began to menstruate at eleven and a half years; later she flowed for a month. Medication was useless. Curetment caused prompt cessation of the flow and the periods then recurred normally. In neither case was sufficient hypertrophied mucosa removed from the uterus to account for the bleeding.

Commenting on these almost identical cases the reader called attention to the importance of sexual hygiene at the beginning of puberty, the futility of administering drugs to cause contraction of the small undeveloped uterus, and the importance of organotherapy in these cases in which a glandular maldevelopment is probable.

Examination under anesthesia was necessary after palliative means had failed, and the use of the curet if necessary. Seldom would a radical operation be necessary, though cases had been reported in which a hysterectomy would have saved the patient from succumbing to excessive loss of blood. The prognosis in general was good and the cases were to be regarded as medical, rather than gynecological or surgical.

DISCUSSION.

DR. HOWARD C. TAYLOR, New York.—"In taking up the discussion of uterine hemorrhages in young girls we will consider first the

causes and then the treatment. So far as the real cause is concerned, I agree with Dr. Coe that we know very little about it. First, in regard to the ovary as an etiological factor. In none of the cases of uterine bleeding in young girls which I have seen have I been able to demonstrate any palpable lesions in either ovary. Neither have I noticed uterine bleeding as a symptom of ovarian tumors that I have seen in young girls. There is of course a close physiological relationship between the ovaries and the endometrium, and while there may be some functional disturbance of the ovaries, that is the cause of the uterine bleedings, it is not in my experience the result of a lesion of the ovary that is clinically demonstrable."

"In regard to the uterus itself we will consider the cervix uteri and the fundus uteri. I have seen a number of cases of bleeding in young girls, in whom the cervix has been so badly eroded that there is really an eversion of the cervical mucous membrane. Associated with this and probably secondary to it, is an hypertrophic endometritis. So far as the fundus uteri is concerned, I have found associated with the bleeding of these cases either a marked hypertrophy of the endometrium, sometimes with the formation of numerous small polypi, or a marked atrophy of the endometrium. As to the real causes of these conditions, I have no definite idea."

"In regard to treatment it does not seem to me that we need to hurry too much in these cases. A malignant disease in the uterus in a young girl is so rare that we can practically leave it out of consideration, and if the bleeding is not of such an extent that the general health of the patient is being undermined, it is best to wait, and to temporize rather than to definitely interfere. So far as drugs are concerned, they have been of very little value in my hands beyond convincing the patient and family that something is being done.

"I do not agree with Dr. Coe in regard to examinations. It seems to me if a girl had anything wrong that she should have an examination that will definitely tell the nature of the trouble. To me a rectal examination is always unsatisfactory, and if the case demands examination of any kind, I feel justified in making a vaginal examination. Neither does it seem to me that it must necessarily be done under ether. Perhaps I am wrong in subjecting a young unmarried girl to a vaginal examination without anesthesia, but I do not think so. We are between two evils. If we insist on an anesthetic, in order to make a vaginal examination, we may make a more lasting impression on the girl than if we make no special disturbance about it. Furthermore, subsequent treatments may be necessary and an anesthetic for each treatment would not be at all feasible.

"In the treatment of the case if there is anything wrong with the cervix, it of course has to be repaired in one way or another. There is no way to determine the condition of the endometrium except by the use of the curet, but it should be used with care for fear of cutting down the endometrium too much. It seems to me that even to-day it is not out of place to call attention to the fact that great

harm may be done by curetting too thoroughly. It is much better to have a girl flow too much than to have a curetting done so thoroughly that she flows too little, as there is little that can be done to remedy such a condition.

"I have used in a number of cases intrauterine irrigations with a solution of tincture of iodine. I remember one case in particular. That case was curetted once or twice or three times, and in spite of the repeated curetting she continued to bleed to the extent that she had a very marked secondary anemia. The case was subsequently cured by injecting a solution of iodine into the uterine cavity. The patient remained cured and has had children."

DR. ARNOLD STURMDORF, New York.—"Pubescent metrorrhagia as depicted by Dr. Coe presents two questions to the clinician: 1, Why do these uteri bleed so persistently, and 2, why have we failed to control the bleeding?"

"Many attempts have been made to ascribe this bleeding to anatomic defects in the generative organs. These attempts have failed almost universally, and one after another of the alleged etiologic factors failed to exhibit that uniform synchronism with the hemorrhage essential to establish a direct relationship of cause and effect, so that we may assume that the title of functional metrorrhagia is justified. In establishing the functional nature in this condition we establish a favorable prognosis; for, notwithstanding the persistence and gravity of the hemorrhage, it is well to bear in mind that most of these patients will recover in time. As coagulation is Nature's universal hemostatic, it is important to induce coagulation in order to control the bleeding. These hemorrhages present a perverted menstruation and while the noncoagulable character of normal menstrual blood is generally recognized, the identical noncoagulability of the blood in these cases under discussion has escaped the attention of observers. Yet this noncoagulability in perverted protracted form embodies the etiology and dominates the treatment of the hemorrhage. This loss of coagulability is not due to the presence or deterioration of any element essential to coagulation but to the presence of an inhibiting substance that is periodically secreted by the corporeal endometrium, from which it may be expressed. Such expressed endometrial juice is capable of inhibiting coagulation in any normal blood. The endometrium is activated to the secretion of this inhibiting substance by a hormone generated in the Graafian follicles. Although we have not succeeded in isolating this substance, it may be circumvented by measures focused on two objective points: the regulation of the systemic blood pressure and the inhibition of the endometrial hyperactivity. The vascular hypertension may be diminished under the guidance of a reliable blood-pressure apparatus. by the administration of aconite, nitroglycerin and especially atropin. Opium is given as a sedative at the same time. Ergot is contraindicated as its specific influence on the musculature of the puerperal uterus is not realized in the non gravid organ, while its tendency to increase vascular tension merely prolongs the bleeding. This

also applies to the use of hydrastin and cotton-root bark, while stypticin, stypol and all the later synthetic oxytoxics are absolutely inert. The curet should not be used without other obvious indications and the existence of the latter places the case outside of the category of functional metrorrhagia herewith considered. Locally, the application of acetone and formaldehyde is of benefit injected into the cavity by means of a syringe. Applications of the high-frequency current are also of value in these cases."

DR. ROBERT T. FRANK, New York.—"I agree with Dr. Coe that rectoabdominal examination is usually satisfactory; but like Dr. Taylor, I never hesitate to make a vaginal examination if more information is needed.

"From an etiological standpoint, the hemorrhages of puberty, adolescence or maturity (uncomplicated by infection or previous childbirth) do not differ. The ovary is mainly at fault in each. In several cases of bleeding in the early teens the curettings closely resembled those obtained from women near the menopause—fungoid cystic changes being found; but cases with normal endometrium, as instanced by Dr. Coe, also occur.

"In several instances, especially in one in a girl of eighteen (bleeding for fifteen months, twice curetted, injected with horse serum, given calcium lactate, etc., etc., hemoglobin 40 per cent.), x-ray treatment of the ovaries has proved effectual. The exposures should be continued until the menses occur only every six to eight weeks and the bleeding becomes scant. These patients must be kept under observation for some time. Usually the menses return to the normal type. By this treatment these youthful patients are saved from a mutilating operation, which at least in the above case had been advised."

DR. H. P. JACK, Hornell, N. Y.—"I only want to say, assuming that these cases have been considered from every direction and no pathological reasons can be found, that there are internal remedies that do good. Why they do it, I do not know, but I am going to put it before you and let you think it out. I have had experience in very many of these cases. There are a large number of women who are past the puberty age and lose too much blood. In many, hygienic measures and various remedies including the extract of parotid gland have been administered without relief. These women hardly seem to recover from the exhaustion of one menstrual period before the next begins. I think you have all seen that thyroid extract in small doses, long continued, seems to be of benefit in a few cases, but the thing that has practically cured almost every one of these severe cases, in my experience so far, is calcium chloride. I have two cases now under treatment; one in particular has been brought from a complete nervous wreck to brilliant health by the continued use of this drug alone. She is a factory employé and no other means have been used to attain this gratifying result. Therefore, I just want to say that whatever the theory as to the cause of this condition is, in my experience it is curable by the use of calcium

chloride. My own personal opinion, combined with the studies of the cases I have had, have led me to believe that there was some psychic neurotic condition back of most of these hemorrhages for which we could find no definite cause and it was on that theory that I administered the calcium chloride, on the same theory that Charles Mayo uses it in his goiter cases, not to stop the hemorrhage but to raise and equalize the nerve tone."

Session of April 29.

DR. F. C. GOLDSBOROUGH, of Buffalo, N. Y., read a paper on

RETRODEVIACTION OF THE UTERUS IN THE PUERPERIUM AND IN NULLIPAROUS WOMEN.

Dr. Goldsborough, in referring to the frequency of retrodeviation of the uterus, stated that this term did not refer to either retroflexions or retroversions, which are more frequently encountered in women who have had children and shows that during the period of involution following childbirth, the uterus very often does not return to its former position. He had observed that the percentage of retrodeviations occurring in hospital patients examined two weeks after delivery was much smaller than in private patients examined at the end of four weeks, which would indicate that the displacement occurred rather late in the puerperium. In order to determine how the retropositions were caused, or could be prevented, Dr. Goldsborough had examined his patients regularly at the end of two weeks and again two or three weeks later, noting at the time of his first examination the degree of the relaxation of the vaginal outlet, the position of the cervix, both in regard to its level in the pelvis and its position and direction. In ninety-one examinations made at the end of two weeks and again at the end of the month, he found that he could predict at the first examination what the position of the uterus would be at the end of a month in seventy-six cases. Of these it was predicted in fifty-seven that the uterus would be in a normal position. In nineteen it was predicted that the uterus would be turned back. In the remaining fifteen the prediction was incorrect, among which a retrodeviation was found in all, where a normal position was looked for. Dr. Goldsborough stated that three groups of cases could be differentiated. In the first are included those cases in which we can be certain that, as involution continues, the uterus will remain in a normal position; in the second group we can be certain that the uterus would become retrodisplaced; in the third group we would be in doubt, but this number will probably become smaller and smaller as we become more experienced. In the first group it is not necessary to do anything except to confirm the previous opinion at the end of four weeks. In the second group, treatment can be begun, whereas in the third group an examination at the end of four weeks will be necessary and any abnormalities present corrected.

Dr. Goldsborough believed that in every instance it was wise to begin treatment early, when the patient is just getting up and still considers herself more or less of an invalid; she would at this time attach no special importance to the introduction of a pessary and there would likewise be no difficulty in getting the uterus into a proper position. Dr. Goldsborough next considered the findings on examination at the end of two weeks which would aid in determining the ultimate position of the uterus. By the tenth or twelfth day of the puerperium the uterus should descend into the pelvis and then as involution continues the fundus falls either slightly forward or backward. The position of the cervix is the best guide in deciding whether the fundus will go either forward or backward. If the former is far back in the pelvis near the sacrum, as involution progresses the abdominal pressure will cause the fundus to tip slightly forward; whereas, if the cervix is in the anterior part of the pelvis near the symphysis the reverse will occur. If a pessary is introduced to hold the cervix in the posterior part of the pelvis, the fundus as the uterus involutes will not have room posteriorly and will be forced into an anterior position. The speaker claimed that the amount of relaxation of the vaginal outlet did not seem to play any part in this process, for in many cases with considerable relaxation the uterus will be found in a normal position, while in others with an intact perineum the uterus will be found retrodisplaced. The length of the anterior vaginal wall, moreover, seems to play a part, for when this is short the cervix is held near the symphysis and the fundus goes back. The relaxation of the uterosacral ligaments likewise permits the cervix to assume a position in the anterior part of the pelvis. Dr. Goldsborough thought it much easier to correct malpositions at the end of two weeks, especially where it seemed probable that the uterus would be retrodisplaced. Only in the doubtful cases did he advise waiting four weeks.

The question as to whether retrodeviations in nulliparous women cause symptoms is open to argument according to Dr. Goldsborough. He believes that many, if not all, nulliparous women with a retrodeviation of the uterus present this as a normal condition. In practically all of such cases when a pelvic examination is made, it is found that the cervix is in the anterior part of the pelvis and if an attempt is made to push the same backward, the anterior vaginal wall is immediately put on the stretch which shows that it is short. If we consider the position of the uterus in infancy and again in adult life, we will see that the process is somewhat similar to that of the change during puerperal involution. In infancy the uterus is an abdominal organ, the cervix being at the brim of the pelvis. There is no angle between the cervix and fundus and these two portions are on the same straight line. During childhood the uterus descends into the pelvis and Dr. Goldsborough claims that if the uterosacral ligaments are short and the anterior vaginal wall long, the cervix will be maintained in the posterior part of the pelvis and the intra-abdominal pressure will cause the fundus to tip slightly forward. On the other hand if the anterior vaginal wall is short and the utero-

sacral ligaments long, the cervix is held in the anterior part of the pelvis, the fundus is forced backward by intraabdominal pressure and the so-called retrodeviation results, which must in this case be considered normal. Dr. Goldsborough believes therefore that all such cases of retrodeviation should be studied individually before attributing their symptoms to retrodeviation.

DR. GEORGE W. KOSMAK, of New York, presented a paper on

THE EFFECT ON SUBSEQUENT LABORS OF OPERATIONS FOR UTERINE DISPLACEMENTS.

The generally recognized desire and necessity for correcting uterine displacements having resulted in the development of a large variety of corrective procedures, their effect on possible future pregnancies has frequently demanded attention. In cases of either retrodeviation or procidentia the result desired is accomplished most frequently by shortening one or more of the suspensory uterine ligaments or using these to secure new points of suspension. In addition, owing to occasional failure of these operative procedures to retain the uterus in its new position other methods have been devised for the purpose which displace the organ to a degree that under no circumstance could be considered normal but which serve its purpose by causing the uterus to be retained in a position where it does not directly produce symptoms. This applies to that particular class of operations in which the uterus is firmly fixed in a position below the bladder. In such cases the outcome of a subsequent labor, if the woman is still in the child-bearing age, is very doubtful. The cases of serious dystocia are frequently met with in such women.

Abnormalities in labor following corrective uterine operations were divided by Kosmak into three classes, and personal cases observed in private practice or in the wards of the New York Lying-In Hospital were presented to illustrate the same. The first group concerns those in which a retroverted uterus is corrected by the Kelly or Gilliam operation. This class offers comparatively little resistance to normal labor unless a fixation has resulted instead of a suspension. A slow engagement of the head with a greater or less degree of uterine inertia is frequently noted in these cases. The second group includes those in which a fixation of the uterus to the abdominal wall has occurred either by deliberate intention or by accidental adhesions following the performance of a suspensory operation. In the case described to illustrate this class, the cervix at the time of labor was found high up in the vagina and the uterus was firmly fixed and had been in a state of tonic contraction for many hours. The high position of the cervix, the tonicity and fixation of the uterus, the exhausted condition of the patient and the liability to uterine rupture determined the decision to deliver the woman by abdominal Cesarean section. This was accomplished without much difficulty and the woman made a good recovery. Another similar case which likewise required delivery by Cesarean section was also described. In both of these, extensive adhesions

were present and in one a loop of intestine was firmly involved in the same. The third group of cases concerns those in which an interposition operation has been done without effective means having been taken to sterilize the patient at the time of operation. Here the degree of dystocia is apt to prove of very serious consequence to the mother and the number of cases of this kind which have thus far been reported constitute a serious warning to those who have done this operation without the usual precautionary measure referred to. The illustrative case in this group was concerned with a multipara about seven months pregnant who was bleeding from a placenta previa. The cervix was rigid, elongated, high up in the vagina and admitted one finger. It could not be pulled down and a centrally situated placenta previa having been diagnosed, it was thought that immediate delivery by Cesarean section afforded the best chances for the woman. This was accordingly done and the patient made a good recovery. Eight months later the same patient was again seen by Dr. Kosmak and found to be about three months pregnant. She was bleeding slightly and an examination disclosed a cervix in the same relative position as previously and slightly dilated. The uninterrupted bleeding and the unfortunate outcome of the previous pregnancy, in a uterus which had been subjected to an interposition operation and a Cesarean section, made it seem advisable to empty the uterus and at a subsequent time sterilize the patient. This was accordingly done and the woman made an uninterrupted recovery.

A review of some of the more recent literature which followed showed that the various operations for the correction of uterine displacements which interfere with the enlargement of this organ during pregnancy often resulted in a very deleterious manner as regards the mother. The speaker called attention to the fact that as the uterus is created to serve a definite purpose, this must not be interfered with by operative procedures. It would appear from the number of serious complications constantly reported that this fact is not always kept in mind and that the gynecologist or surgeon who operates for uterine displacements is not sufficiently concerned with what may happen to his patient later. He is more interested in restoring the uterus to its anatomical position than in preserving the organ for its essential uses. Kosmak believes that the various procedures which plicate the round ligament and the broad ligament are preferable to those which create artificial supports for the uterus and that although the various vaginofixation procedures undoubtedly produce a symptomatic cure, the unfortunate results, which have and are still being reported as occurring in subsequent labors, ought to make it a universally recognized rule that these should not be resorted to in child-bearing women unless effective means of sterilization are employed. The speaker believes that this warning should be widely circulated, particularly among surgeons who perform gynecological operations and also among gynecologists who do not do active obstetrical work and are not liable to meet with the effects of such operative procedures.

DISCUSSION.

DR. RALPH W. LOBENSTINE, New York.—“The three great causes of retrodisplacement of the uterus in the early weeks postpartum are: (1) A lowered muscular tone of the individual before labor, (2) subinvolution and (3) previous retroversion or retroflexion, especially of the infantile type.

(1) The lowered muscular tone is seen more often probably in the civilized races, in those women who have been pampered and who are leading the modern unnatural social life. With increasing civilization we expect and we find improvement in hygienic conditions and improvement in many gynecological conditions. However, with the modern life there is a heightened irritability of the nervous system and it is this that is responsible for so many of the ills of the present day connected with parturition.

(2) Subinvolution is chiefly dependent upon, first, lacerations of the cervix and perineum; second, great overdistention of the lower anterior segment of the uterus; third, a failure of the cervix to be drawn up properly into the lower zone. If this does not take place, not infrequently the cervix becomes more and more edematous and greatly stretched; fourth, too early rising after labor, prolonged labor, and varying degrees of infection.

(3) Those cases with the so-called congenital misplacements, especially if a flexion is present, are but rarely cured by pregnancy.

My experiences, I fear, do not coincide entirely with those of Dr. Goldsborough. While I believe that in certain cases, at the end of two weeks, we can predict correctly what the position of the uterus will be in subsequent weeks, still I feel sure, from my own observations and that of others, that a uterus may be in place at the end of two weeks or even four weeks, and yet be out of place at the end of six or eight weeks. Moreover, in certain cases in which the uterus is out of place at the end of three or four weeks, we may find that a spontaneous replacement has occurred by the sixth or eighth week.

Finally, while I admit with Dr. Goldsborough that the majority of cases of simple retroversion after labor are decidedly helped by the use of the pessary, yet I do not feel that the majority of cases are permanently cured thereby.”

“The subject taken up by Dr. Kosmak in his interesting paper is one that calls for careful attention from all those who are operating for the cure of the various displacements of the uterus during the child-bearing period. No operation that in a measure fixes the uterus should be performed during this period, unless a resection of the tubes is likewise carried out; and furthermore, great care against infection must be used in performing any one of the various suspension operations, for with infection there is apt to result some degree of fixation. With the lesser grades of fixation, there exists a tendency toward the development of abortion, premature labor, and hemorrhage. In the greater degrees of fixation severe dystocia may result. This is the only feature of real importance and it is dependent upon two essential causes. (1) A change in the axis of

engagement of the presenting part, whereby the presenting part is forced, not into the true pelvis, but into the false pelvis; (2) the development of a muscular tumor in the lower anterior segment just above the cervix. This muscular mass varies in size, the size depending largely upon the amount of fixation. I have personally met with six cases of pronounced dystocia following fixation operations. Three of these were delivered by abdominal Cesarean section, one by vaginal Cesarean section, and two by artificial dilation and internal podalic version. This latter procedure is attended by some risk but is at times justifiable, even with the complications present that we are discussing. In closing I would draw attention to the great importance of recognizing this complication early in the labor."

DR. W. M. BROWN, Rochester, N. Y.—"There are some remarks that I desire to make on these two papers. After listening to a similar paper some months ago, I thought I would make another attempt to correct my feeling about pessaries, and since that time I have tried in several cases, the use of pessaries after labor, and absolutely without any beneficial result. One case I have in mind particularly in which there was no short anterior vaginal wall. It was perfectly easy to replace the uterus but you could not hold it there, and the pessary would not stay in that woman at all. Then I got one so big that it impinged on the bony pelvis but it was very unsatisfactory and would not stay in position. That woman nevertheless has been practically cured. She was the wife of a physician, and after her first labor had a marked retroversion and subsequently a miscarriage due to the retrodisplacement with an incarcerated fundus. She became pregnant again and with great care was carried through. This time, in addition to the knee-chest position, she asked if she might try a scheme that a friend of hers had proposed, which I approved of when she told me, and it has apparently done more than I have ever seen in similar cases. This was the almost daily exercise of swimming. In that patient at the present time the pelvic contents are practically perfectly normal, after about three months of swimming exercises and the knee-chest position with no pessaries of any kind.

"As to the questions referred to in Dr. Kosmak's paper. Some years ago I gave up all attempt at abdominal fixation, or suspension of the uterine body, because of the question of possible dystocia. In cases where it has seemed that it was imperative that some support to the uterus should be given from above, I have in a few cases shortened the ligaments intraabdominally without fastening them to the abdominal wall, even perhaps carrying them down through the broad ligament and fastening them to the posterior portion of the fundus or something of that kind. In one patient I have in mind particularly, in whom there was a complete prolapse of both ovaries, away down in the culdesac, I brought the round ligaments down through the broad ligament from before backward, lifting up the ovary and broad ligament and fastened the round ligament to the posterior wall. The woman subsequently has had two children,

and there was apparently a perfect result, and the uterus still remains in good position and well elevated."

The question of distortion is very vivid in my mind at the present time in connection with an operation for retrodisplacement, also after a Cesarean operation. Several years ago I did a Cesarean section on a woman by a method I formerly used, which was a complete turning out of the uterus through a long incision and the woman had an adhesion of the whole length of the scar to the abdominal wall, omentum and everything else. Nine days ago I had occasion to do a second abdominal delivery on her, and the distortion was simply frightful. The uterus was twisted and deflected to one side, the child was almost transversely located; it was a breech presentation and the posterior part of that uterus was enormously extended and it was not an easy condition to handle. She got along beautifully and is almost ready to go home from the hospital, but had she even been allowed to think of going into labor, there would have been disaster without question."

DR. F. C. GOLDSBOROUGH, Buffalo, N. Y.—"My experience apparently has been different from that of both Dr. Brown and Dr. Lobenstine. As regards predicting the position the uterus will eventually assume at the end of two weeks, the figures I gave you showed that in a little over 80 per cent. I was correct, and I think I have studied the matter until I can feel considerable confidence in making this statement. As regards the question of curing patients, either by preventing or curing retrodisplacements of the uterus in the puerperium, my experience has been different from Dr. Lobenstine's, in that I have had very satisfactory results from the use of pessaries. I have tried the knee-chest position and it was not satisfactory. I am at the present time working on my cases to see if I can get a sufficient array of figures to convince others as well as myself that I am right in my opinion as to what to do with the uterus during the period of involution to prevent the occurrence of displacements later. I have had very very satisfactory results and I feel that if more attention were given to that matter during the period of involution, we could do away with the necessity for the operative procedures for the correction, and do away with the difficulties that Dr. Kosmak has referred to in his paper."

DR. GEO. W. KOSMAK, New York.—"I think the keynote of this discussion resides in the fact that we should employ more prophylactic treatment to avoid the possibility of these retrodisplacements, because in nine cases out of ten, they occur in women who have had children, and a lack of attention to the puerperium has probably resulted in most instances in their production."

"There is another point to be noted in the delivery of women in whom a previous abdominal operation has been done for the correction of displacement of the uterus, and that is that we should not delay too long radical operative interference in these cases. I think it is a great mistake to allow a woman to remain in labor for twenty-four or forty-eight hours, in the hope that the head will finally engage. In one of these cases in which we did a Cesarean section,

we found a great many adhesions present, which involved the intestines. Now, suppose we had succeeded in delivering this woman by the vaginal route, we would still have had to contend with these adhesions; they would have interfered with involution, and the involvement of the intestines in this mass would probably, or might have resulted in a greater or less intestinal obstruction."

"Version has been recommended as a procedure to be followed in these cases, but I merely want to refer to its great danger. We can never tell just how much fixation in the uterus in present. We cannot tell in doing a version how much extra strain we are going to put on the thinned out uterine walls, and this procedure I think ought to be omitted."

"Just a word in conclusion, to draw attention to the necessity of greater coordination in the work of the gynecologist and the obstetrician. It seems to me the gynecologists and surgeons do not recognize the necessity for either keeping the uterus in a child-bearing condition, or else eliminating it from the possibility of this complication. I think if that knowledge were more widespread, we would have less serious cases of dystocia following this class of operations."

DR. ANGENETTE PARRY, of New York, read a paper on

PREGNANCY AND THE TUBERCULOUS WOMAN.

After reporting a personally observed case with an unfortunate outcome, Dr. Parry stated that the principal object of her paper was a protest against the ignorance or carelessness of physicians who allow their tuberculous women to marry before they are cured, if cure be possible. Dr. Parry believes that the physician should assume full responsibility in such instances and spoke of the changing status of opinion from the time of Hippocrates down through the centuries, when pregnancy was supposed to have a beneficial and even a healing effect. This superstition is still widely prevalent among the laity at the present time although the overwhelming majority of thinking persons have come to recognize the dangers of pregnancy and labor and the commonly fatal ending within a few months after delivery. The speaker presented briefly some of the modern opinions as to the treatment of these cases, including prophylactic and therapeutic measures, sanitarium, compression of the lung, therapeutic abortion, sterilization, excision of the placental site, etc., together with statistics as to the final results. She also called attention to the fact that the children born of tuberculous parents are in poor condition and present a lack of resistance to this and other diseases. The recent opinions regarding infection *in utero* show this to be less of a rarity than was formerly believed. The handling of these cases includes sanitarium treatment or its equivalent for mother and child, absence of breast feeding, isolation of the child from the mother for most of the time where the process is negative, and the substitution of a healthy wet nurse for the child if possible. Dr. Parry believes that the matter is an extremely vital one not only from the standpoint of the parents and the offspring but also the community at large.

DISCUSSION.

DR. RALPH W. LOBENSTINE, New York.—“This subject is such an important one that I feel constrained to add my testimony to that of Dr. Parry’s, with the hope of accentuating the fundamental facts brought out by her, in her most excellent paper. We may safely conclude after careful study that:

1. Not infrequently pregnancy, especially if too rapidly repeated, will lay the foundation for the development of tuberculosis.

2. Either pregnancy or the act of parturition aggravates an existing tuberculosis in a large proportion of cases. In those patients suffering from a moderately severe involvement, an aggravation of symptoms is seen in from 65 to 75 per cent. of cases. In severe grades of the disease there is almost always a marked change for the worse. In v. Bardeleben’s series 71 per cent. grew worse from parturition and 47 per cent. proved fatal among the active cases. In my own series there were thirty-eight severe in type; of these 50 per cent. died within two months after labor. All bad cases lose ground rapidly either during labor or within a short time thereafter. During the puerperium the tuberculosis may assume a fulminating character and may cause death in a surprisingly short time.

3. The general causes of this rapid change after labor are the prolonged muscular exertion, the exhaustion of labor, the loss of blood, the use of anesthesia and the possibility of renewed toxins and tubercular bacilli being forced into the system from the placental site. These are all serious in their results and should be ever kept in mind.

4. When we turn to the child we find that it enters life seriously handicapped. Even if not tubercular at birth, a large number of children show poor resistance. At birth and thereafter they should be given every advantage. As a rule nursing from their mothers should not be allowed unless the tuberculosis in the mother is quiescent. Over 50 per cent. of children of tubercular mothers die in the early months, when allowed to remain in contact with the tubercular parent or parents. Inasmuch then as the results are so serious when pregnancy is complicated by tuberculosis, a therapeutic abortion is indicated in the early months in all active cases. This should of course only be carried out after due consultation and thorough understanding on the part of the patient and her family. Further pregnancies must be avoided. Emptying the uterus in the later months, with the patient losing ground, will accomplish but little; in fact, such a procedure not infrequently may cause an earlier death. Finally, I believe strongly that tubercular individuals should not be allowed to marry, if they do, despite expert medical advice, they should not be allowed to propagate.”

DR. JOHN O. POLAK, Brooklyn, N. Y.—“I am fully in accord with Dr. Parry’s position and also that of Dr. Lobenstine, *i.e.*, that tuberculosis and pregnancy are incompatible at certain stages of the disease, and when we have indications, as we do in any active process for the interference I wish particularly to speak of the

method of emptying the uterus. Considerable experience has shown us that unless these cases are emptied very early by the curet under morphin and hyoscin, we have a prolonged or piecemeal abortion with metrorrhagia and infection, and we have found the most satisfaction is gained in these cases when the pregnancy is over eight weeks (because they do not tolerate anesthesia well) by using spinal anesthesia or local anesthesia to open the uterus by vaginal hysterotomy. Before the eighth week ordinary curettage under a local anesthesia can be done without the slightest difficulty. After that time when the placenta formation has taken place, I would very strongly call your attention to the value of anterior vaginal hysterotomy under local anesthesia, or if it is more advanced, under spinal anesthesia."

DR. THOMAS S. CULLEN of Baltimore (by invitation) gave an illustrated talk on

DISEASES OF THE UMBILICUS.

In order to make the subject as clear as possible he first considered the embryology of the anterior abdominal wall, dwelling at length on the manner in which the amnion gradually encircles the embryo meanwhile pushing the yolk sac farther and farther away. A connecting link, however, still persists between the embryo and the yolk sac. This is the omphalomesenteric duct.

In like manner he took up the development of the allantois and of its intraabdominal portion, the urachus. He clearly depicted the gradual development of the celom.

In the course of his talk he showed the component parts of the umbilical cord during the various stages of embryonic life. After this preliminary talk on the embryology of the navel region, a study of the diseases of the umbilicus was more easy of understanding. Cullen then spoke of the infections of the umbilicus in the new-born and referred to the epidemics of fatal infection in infants that occurred synchronously with puerperal sepsis in the mothers. With the stamping out of the maternal infection that in children also waned.

He discussed pathological conditions due to remnants of the urachus and of the omphalomesenteric duct and also referred to the escape of peritoneal accumulations from the umbilicus in children.

Cullen then described umbilical tumors occurring in children and referred to benign and malignant umbilical tumors developing in the adult. One of the most interesting nonmalignant umbilical tumors is adenomyoma. This occurs only in women and the glands present are identical with those of the uterine mucosa. They are also surrounded by the characteristic stroma of the uterine mucosa.

Secondary carcinoma of the umbilicus is by no means rare. When present it usually follows a primary carcinoma in the stomach. The umbilical growth may be the first tangible sign of malignancy, the gastric cancer giving rise to no symptoms whatever.

Cullen also briefly referred to the escape of gall-stones and of foreign bodies from the umbilicus.

DISCUSSION.

DR. HOWARD LILIENTHAL, New York.—“I do not see what there is left after Dr. Cullen gets through, and I am sure you feel the same way about it. A number of years ago, Dr. Gerster, who as you all know is one of our pioneer general surgeons of the antiseptic era here in New York, was attacking the way in which the various specialists had stolen away gradually everything from the general surgeon. The proctologist had taken away the rectum, and the hernia specialist had taken away the rupture, and the gynecologist had arrived, and so on, and he said finally in his picturesque Hungarian accent, which I cannot imitate, “Finally, we shall have to be satisfied to take care of the diseases of the umbilicus!”

Now, Dr. Cullen has shown us that the umbilicus is, after all, what might be called the glass-blower's pipe, into which is blown everything which makes the human being. Every part of a man in some way or other is connected with the umbilicus. The only thing that surprises me is that Dr. Cullen did not find brains, or anything of that sort coming out of it. Now, it certainly is true that a man who is enthusiastic and scientific, and who has the spirit of investigation upon him, can make something of what looked like nothing. I have never seen a more beautiful, and more clear, and altogether delightful exposition of a subject than Dr. Cullen has given us to-day. He has shown us new and interesting phases of the whole subject. He has shown that the diseases of this one little part may be connected with almost every part of the body.

I have had a little experience with the diseases of the umbilicus but mostly in adults. I remember many years ago a man came to me who had a tumor about the umbilicus, a hard indurated mass. The man was in a magnificent condition, and I thought I was dealing with a fibroma, or something equally innocent, but when I operated, I found that it was a malignant growth of the umbilicus, and that it came from a sarcoma of the small intestine. The man was hopelessly ill, and nothing could be done for him. Since then I have seen other cases in which the malignant growth of the umbilicus was evidenced simply by a general diffused hardness about the umbilical ring, and I now look upon all these cases of periumbilical induration with the gravest suspicion, and will not give a prognosis until I have operated.

Only a short time ago, the patient is still living, a woman came to me with a papilloma of the bladder, which completely filled the viscus. The bleeding was too free for intravesical therapy. I performed a suprapubic cystotomy and came down upon the tumor attached by a pedicle which was cut off, and the tumor taken out entire. It was examined and pronounced a papilloma down to the very base and there was no malignant disease according to the pathologist. After that, this woman had pains in the suprapubic scar which proved to be caused by a transplant of the papilloma. I treated her with high frequency current until one day she called my attention to a mass in her abdomen. When she came to the hospital

for her exploratory laparotomy, I found the umbilicus involved in this mass, and I at once knew the nature of the disease. I operated and found general carcinosis of the abdomen. Speaking of gall-stones: I found in looking up the matter in W. E. Horner's "Treatise on Pathology," published in Philadelphia in 1829, a case of a woman passing gall-stones through her umbilicus. I also found one or two other things which Dr. Cullen has not given us, although I know he knows of them. A chronic abscess about the umbilicus, Albert says, should always be regarded with suspicion, because it is very apt to be actinomycotic in character. I may mention, as a curiosity, a case reported in Murphy's year book for 1910, in which a patient with an umbilical hernia went swimming, and a fish bit off the hernia, leaving fortunately, the omentum, protruding and uninjured. The fish had the sac and that was the end of the hernia. The wound was sutured and the patient was cured."

DR. THOMAS S. CULLEN, in closing said: "I was very much interested in what Dr. Lilienthal had to say. I purposely did not go into the question of gall-stones passing through the umbilicus as my intention was to give merely a glimpse into the various lesions occurring in the umbilical region. I have taken up but a few of the pathological conditions occurring in this region. I have collected the literature on gall-stones and this will be published in the near future. I furthermore did not mention the fact that in one instance a patient had passed a knitting needle into the uterus, to bring on a miscarriage. Nothing came of it, but finally the patient had a great deal of discomfort in the umbilical region and the doctor found the knitting needle pointing at the umbilicus. He made pressure upward through the vagina and the knitting needle was removed through the navel. There have been several other cases somewhat similar in character, but I left out fish stories completely (laughter)."

"The subject of diseases of the umbilicus is really an interesting one, and nobody as far as I know, had considered the subject as a whole. Pernice in 1892 collected statistics concerning tumors of the umbilicus and gave us a very satisfactory article. When one remembers that in early life the umbilicus is the main highway between mother and child, it is perfectly natural that we should find elements lingering along the path."

DR. W. P. MANTON, of Detroit, Mich., read by invitation a paper on

ASPHYXIA NEONATORUM AND ITS SEQUELÆ.

This paper gave an account of the processes affecting the cerebral circulation of the infant during labor and also the etiology and symptomatology of asphyxia livida and asphyxia pallida. When labor is from any cause prolonged unduly, when a malformation is present, when coiling of the cord narrows the lumen of the funic vessels, when the fetus is expelled unripe and when the forceps are injudiciously used, the circulatory balance is gradually lost and asphyxia supervenes. It is shown that in the normal imbrication of the cranial

bones in molding of the head no harm is done to the substance or vessels of the brain, but when excessive overlapping occurs the cerebral vessels are ruptured or lacerated, intracranial hemorrhage occurs and asphyxia, generally of a fatal character results. The author is not in accord with the generally accepted theory of alienists that birth brain trauma is responsible for the later developing cerebral paralysis of children, largely because, when hemorrhage is of sufficient moment to produce harm, the child dies either during labor or within the first week or so of postnatal life. His arguments are supported by personal experience and the recorded observations of Walter Hannes and others. The object of the paper is a plea for better obstetrics, and a more careful and thorough study of each individual gravida by the physician, and rational prenatal care. It is strongly urged that the latter is of as much, if not more, importance in the prevention of infant mortality than the care which is attempted after the child enters the world. The obstetrician should know his patient and her possibilities, and by pelvimetry and a knowledge of the soft parts of the parturient canal, be in a position weeks and months before labor to determine just what kind of delivery will be best in the interests of the mother and the child. The author is in favor of the more frequent use of the bag dilators for predistention of the vaginal tract and the resulting shortening of the second stage. He favors the induction of early labor when the pelvis is only mildly contracted; he urges the starting of labor pains at or near the time of the estimated date of confinement and believes in Cesarean section in elderly primiparæ where changes in the tissues of the vaginal canal will lead to extensive lacerations, high forceps and probably the death of the child. He is also inclined to the abdominal route in suitable cases of placenta previa and eclampsia. The paper deals with the possibilities of better obstetrics in the interests of the child and shows how prenatal care can and will lessen infant mortality.

The histories of three cases of intracranial hemorrhage with following spastic paralysis and idiocy were appended.

DISCUSSION.

DR. HERMANN GRAD, New York.—“The paper of Dr. Manton is an exceedingly interesting one and he has brought out a great many points as regards asphyxia in the new-born. As I was listening to the paper a case came to my mind which bears on the subject of induction of labor at term, or even before, if there is any disproportion in the pelvis or unusual conditions that would call for such procedure.”

“A case came under my observation very recently which directly bears on this subject. This woman was in the hands of a very excellent obstetrician and she lost three children because of this interference, and her fourth and fifth child were born alive with a very easy forceps delivery, so I think that this practice of induction of labor can sometimes be carried a little too far. Here was a little woman who had a very difficult first labor; she had a slight disproportion and unfortunately an overdeveloped child. She had a very

difficult labor and when the next pregnancy came along, her physician naturally said, 'We will deliver you about three weeks ahead of time.' That child was lost, so was the next one. Now, the fourth one was allowed to go to full term. She had a fairly long labor but it was not unusually long, and we had a live baby and so it was the next time. I think that is a point we should consider. This woman went so far as to be willing to have a Cesarean operation if it was absolutely necessary, to get a live baby."

"Now about asphyxia in babies. In some of these cases of asphyxia we must also consider grave pathologic lesions as the cause of the trouble. Very recently a specimen was presented before the New York Obstetrical Society, where a child was born perfectly healthy apparently, but it could not be made to breathe. The autopsy showed that the child had a large hernia of the diaphragm and the entire abdominal contents were in the chest cavity. Now, from external appearance, one could not tell what was the matter with the baby, and I believe there are a great many cases of asphyxia in babies that have congenital defects that must be taken into consideration."

DR. GEORGE P. SHEARS, New York.—"We have heard something about the forceps in this discussion but nothing about the *kind* of forceps that should be used. There is no doubt whatever that the axis traction instrument, skilfully employed, is far less likely to injure the child than is the ordinary instrument. I believe that any discussion with regard to the lessening of fetal mortality in labor that leaves out of account the axis-traction instrument, neglects a very important, indeed, perhaps the most important element, in the discussion."

"With the ordinary forceps compression is proportionate to the amount of traction. If it is not the forceps will slip. With the axis-traction instrument there need be very little compression. An instrument that is used a good deal in New York is the instrument with solid blades. With this, strong compression is needed to prevent slipping; and we all know that compression is not a good thing for the child."

"My recent experiments at the City Hospital seem to show that oxygen administered to the mother, increases the fetal heart rate and the activity of the fetal movements. As far as I have been able to ascertain, this observation has not been made before. If we can give oxygen to the fetus by way of the maternal circulation, it seems reasonable to suppose that we can do something in the prevention and treatment of antenatal asphyxia. It has been my custom of late to administer oxygen to the mother in cases of prolonged second stage, in partial separation of the placenta, or whenever slowness or irregularity of the fetal heart sounds indicates impending asphyxia."

"Several of my colleagues who names I will not mention here because I have not asked permission to do so, have tried the method and think well of it. I would be very glad to have the opinion of Dr. Manton."

DR. GEO. W. KOSMAK, New York.—"I intended to keep out of this discussion, Mr. Chairman, because my views on the induction

of labor at term have been very much scorned and scorched in various medical meetings. However, I agree heartily with Dr. Manton that we ought to observe a woman very carefully during the progress of her entire pregnancy, so that we can be more or less convinced as to the date at which labor ought to be expected. I think we can gauge the matter very satisfactorily if we measure the fundus at regular intervals, and if by means of a bimanual examination we test the ability of the head to engage. Personally, I see no reason whatever for not adhering to this rule and in my own hands it has never gone wrong. I have not been so unfortunate as to deliver premature 5-pound babies at term, and in my own work, I am going to continue in this manner."

"I have often observed that in the ordinary treatment of asphyxia the methods employed are entirely too generous. I have always warned the men who are working in the hospital, the students and staff doctors, not to employ a radical routine treatment for the resuscitation of the infants after ordinary labor. We find that the men as a rule have been taught to seize the child by the feet and slap its buttocks until it begins to cry. It seems to me that is entirely unnecessary, because in many instances, asphyxia is probably due to the presence of a little mucus in the throat, and if we hold that child up by its legs we find in almost every case that the mucus will run out and the respirations begin. For that reason I think we ought to be a little more gentle in our manipulations. Another procedure that is resorted to very often, is the bending of the child's body backward and forward. In the Lying-In Hospital a number of years ago that was done to a child and the spine was fractured. I think it is a thing that always ought to be borne in mind and we ought not to resort to too forcible measures to resuscitate those infants that are slightly asphyxiated. In the severer degrees of asphyxia, we may however have to resort to measures which are very much more radical."

DR. S. J. DRUSKIN, New York.—"The forceps operation may be a good operation when the head has descended into the pelvis or has passed the inlet. By a rapid extraction you save the child from threatened asphyxia. Injury to the pelvic floor may be prevented by a prophylactic episiotomy. Rapid delivery should always be preceded by deep incision of the perineum. To advise, however, a high forceps in contracted pelvis is to recommend a procedure justified neither in practice nor in theory. The fact is you get a dead child and an injured mother. Theoretically the operation is wrong because the pulling and resisting forces are perpendicular to each other. The resistance is met with at the anteroposterior diameter of the inlet (*conjugata vera*) or the biparietal or bitemporal of the head; the forceps or pull is applied in the transverse diameter of the inlet or to the frontooccipital diameter of the head. The head must be grasped firmly to pull it through the inlet and a good deal of pressure is applied. This tends to enlarge the biparietal diameter just where you meet with resistance at the contracted *conjugata vera*. The greater the contraction, the greater is the resistance,

the greater is the pull, the greater is the pressure applied and finally the head is crushed. The effect of the high forceps in contracted pelvis is that of the cranioclast, but you have in addition injured the mother."

"Of course, a high forceps may be a proper operation in a roomy pelvis, say where the pains are ineffectual, but now-a-days the forceps may be dispensed with even in this class of cases by using pituitary extract. Its use has not been mentioned here at all. The introduction of pituitary extract is probably the greatest addition to obstetric practice we have since the days of Oliver Wendell Holmes and Semelweiss when they introduced aseptic methods in the practice of obstetrics."

"So far as induction of labor in contracted pelvis for the benefit of the child is concerned, I must disagree with the reader of the paper, because more than 65 per cent. of the children so delivered survive beyond the end of the third week. The operation is also accompanied with some risk to the mother particularly when the catheter method is employed."

"I must protest, however, most vigorously against Dr. Manton's recommendation to perform abdominal Cesarean section on elderly women with rigid soft parts, simply because labor may be protracted. I do not know whether I understood the doctor correctly. Does he refer to elderly primiparæ? In either case I am thoroughly opposed to such practice. The operation carries with it a considerable mortality and morbidity. I do not know of anyone who has a mortality of less than 1 per cent., and such a serious operation should not be undertaken without first giving the patient a preliminary trial at labor. It is just such advice that is placing the medical profession in an unenviable light. The laity is gaining the impression that doctors are more bent on operating than on helping the patient."

DR. A. J. RONGY, New York.—"I fully agree with Dr. Kosmak that all cases which are overdue should have labor induced on them. Pregnancies that are extended beyond 280 days as a rule result in difficult labors on account of the overgrowth of the child and the bony development of the head. The child does not do well and a great many die during labor although delivery may be spontaneous. Recently I have had this experience with the wife of an intimate friend who was delivered three weeks later than the calculated time. She went into labor and the child died as soon as it reached the pelvic floor. I believe it is dangerous to teach the general practitioner to use the axis-traction forceps. This is a very dangerous instrument even in the hands of the specialist. The injuries produced by the axis-traction forceps to the pelvic floor are not infrequently beyond repair. We all know what effect this instrument has upon the child. A great many of them are stillborn or die shortly after delivery."

"Pituitrin should never be used in the early stages of labor. It is well known that the effect of pituitrin is transient and therefore it would be useless to give pituitrin in cases of labor which are to last six or eight hours. Pituitrin if used injudiciously will cause

asphyxia neonatorum, a point that the general practitioner is not aware of. The indications for pituitrin as used in my services in the Lebanon and the Jewish Maternity Hospitals, are when the cervix is fully dilated, the head molded, and reached the pelvic floor, then it is very effectual and connected with very little danger.

In resuscitating asphyxiated babies, we discontinued the use of the very energetic methods described by the older obstetrician. We find that when a baby is born asphyxiated for some reason, that it is not well to subject it to any of the manipulations given in the standard text-books. Our method is very simple. When a baby is born asphyxiated, the throat is immediately cleared by lifting up the baby by its legs, head downward, and an attendant clears the throat from any mucus that may be there. Then the baby is immediately placed in a basin of warm water and the chest is gently massaged. If at this stage, the baby does not respond and does not attempt to breathe, a catheter is directly introduced into the trachea and direct insufflation performed. We find that babies who apparently are severely asphyxiated, in whom the heart beats drop to 10 or 12, respond to this mode of resuscitation very quickly. Cold water is never used until the reflexes of the child are established."

THE CHAIRMAN.—"Your Chairman had intended to keep out of the discussion at this meeting, because I hold that it is the function of the Chairman to preside, and not to discuss, but I cannot help getting into this for a minute. Dr. Kosmak and I have had a good many discussions on this subject, and Dr. Manton is one of my close personal friends, and I think he is always right—with one or two exceptions (laughter) and I think in regard to his statement about the induction of labor, which is the old story again, I cannot agree with him, or the other gentlemen who induce labor for overterm, especially thinking to save the child. If those gentlemen will take pains to look up the statistics of induction of labor, they will find that the fetal mortality is very high. They will also find a not inconsiderable maternal mortality both in this country and abroad. Furthermore, I have personally, even with considerable experience, not been able to find in a satisfactory way, the time when a woman is due. I know a great many of my friends can, but I cannot. I think most of these babies are due, like a good many of the trains of the Southern Railway, that is, when they get there, and the more I see of obstetrics and the more women I deliver, the less I know when the baby is due. Of course we have isolated cases, and we have cases spoken of where the head does not engage, in the primipara, in the last two weeks of pregnancy, which is a very important point; but in the majority of instances in which I have induced labor, I have been sorry; and in the majority of cases where I have attempted to induce it, and then have not done it, I have been perfectly well satisfied, and I think that is the experience of a great many men. Now, I believe, that with the induction of labor, there is a considerable extra strain on the child, especially if you happen to make a very frequent and justifiable mistake, and have a child which is slightly premature. It is a matter of fact that you do not produce as many

children which breathe, and which are husky, healthy children, where you induce labor, as you do when you let them alone. I am very much pleased that the discussion has been so complete on this subject, because it is a very important one, and is one that is not commonly considered, sufficiently."

DR. FRANCIS C. GOLDSBOROUGH, Buffalo.—"One point I would like just to touch upon, that I was very glad to hear mentioned, and that is the question of paying too much attention to the delivery of the child with an apparently intact perineum. I do not know if the practice is general, but I know in Buffalo a great deal of emphasis is put on that point, and that very often the child is sacrificed with a view of leaving the woman with an intact perineum. Personally, I feel it is much better to have a living child and a slight perineal tear that can be repaired, and I was very glad to hear what Dr. Manton said on that point."

DR. W. P. MANTON, Detroit.—"The object of this paper is to call attention to asphyxia of the new-born as one of the principal causes of fetal death. Of course in the practice of obstetrics the resourceful man is supposed to have more or less education and should have more or less common sense. Now, we are not going to induce labor in all cases which run over, but we are going to keep track of our patients and measure the fetal head with the inlet so that we may know whether that head will engage. Dr. McPherson says that a very large number of these children perish. Of course some die, frequently because the thing has not been properly done and the statistics in results are gathered from here, there and everywhere. I am sure that if careful supervision of the patient during pregnancy is had, there will be a much less fetal mortality. In regard to the use of oxygen, I have never applied it to the mother in the ordinary case, and having had no experience, I cannot speak of its merits. I have used it in a few instances in resuscitating infants. A gentleman mentioned episiotomy. I think I was the first to advocate this little operation and to bring it to the attention of the physicians in this country nearly thirty years ago. It is a very important measure in saving the perineal tissues and preventing serious lacerations. The thing that I am trying to emphasize is that the practitioner who does obstetrics should take greater pains with his pregnant patient and he should not book his patient for a certain date and then never see her again, or be satisfied with a few urinary examinations during the period of gestation. He should have a knowledge of the child and do everything possible for the mother to insure a healthy infant."

(To be continued.)

CORRESPONDENCE.

THE RELATIVE VALUE OF OPERATIONS FOR THE RELIEF OF RETRO-DISPLACEMENTS OF THE UTERUS.

To the Gynecologists of the United States and Canada:

In accordance with the decision of the Fifth International Congress for Obstetrics and Gynecology held at St. Petersburg in 1909, a Committee was appointed at the Sixth Congress held in Berlin in 1912 to collect statistics on the end results of operative procedures for the relief of retrodisplacement of the uterus, and report at the Seventh Congress to be held in New York in September 1915. The Committee is composed as follows:

A. Martin, Berlin.	D. von Ott, St. Petersburg.
F. Schauta, Vienna.	J. Riddle Goffe, New York.
J. L. Faure, Paris.	H. Spencer, London.
E. Pestalozza, Rome.	Th. H. Van de Velde, Haarlem
	(Reporter).

The object of the investigation is to establish if possible the relative value of the many different operations in use for the correction of retrodisplacement of the uterus. Would you be willing to assist us by contributing the remote results of all your cases (both clinic and private cases) on whom you have operated for the relief of this condition of the uterus.

The following points should be noted:

1. No case should be reported that has not stood the test of two years since the operation.
2. Previous gynecological and obstetrical history of the patient.
3. The full minute diagnosis of the cases as follows: Degree of displacement, 1st degree, 2nd degree and 3rd degree ("senkung," "decensus,") but not procidentia.
4. Brief description of the mode of operations, classifying them if possible according to Van de Velde's Enumeration of Retroflexion Operation Methods (Reported at the St. Petersburg Congress.)
5. State suture material used, whether absorbable or not.
6. Complications following operation; pain, incarceration of bowels, inflammation, adhesions.
7. Present position of uterus and adnexa.
8. Time elapsed since operation.
9. Subsequent obstetrical history stating number of normal gestations, and the birth, abortions, extra uterine pregnancies.

It is desirable that we get as large a number of cases as possible so that our report will compare favorably with the reports made by our foreign colleagues.

Will you kindly notify me at once if you will take part in this investigation and furnish to me not later than November 1st, 1914, the

reports of your cases? It will be of help to us if you will do this though the number of cases which you are able to report is relatively small. If you have already published your series of cases I will be glad to receive a reprint at as early a date as possible. If desired, everyone's results will be published separately wherever he pleases and in whatever form he prefers after the Congress.

Yours very sincerely,

HOWARD C. TAYLOR.

JUNE 1, 1914

Reporter for the United States and Canada.

REVIEWS.

DIE WASSERMANNSCHE REAKTION, MIT BESONDERER BERÜCKSICHTIGUNG IHRER KLINISCHEN VERWERTBARKEIT. (The Wassermann Test with Particular Regard to Its Clinical Value) BY DR. HAROLD BOAS. Mit einem Vorwort von Geh. Med.-Rat Prof. A. Wassermann. Zweite, vermehrte und verbesserte Auflage. Berlin, 1914. Verlag Von S. Karger.

In the second edition of this very valuable work, the author has included all the later observations in this important surgical subject in addition to a complete review of the literature. The work presents one of the most complete descriptions of the method and its development which has thus far been published, and Professor Wassermann in his introduction gives the author much credit for the care which he has bestowed on the writing of the same. He calls attention to the excellency of the investigation made in the Danish Serum Institute upon which the book of Dr. Boas is largely based. Attention is called to the importance of making an absolute diagnosis of the presence of spirochetæ in every case as a true confirmation of the serum reaction as shown by the persistent positive result of the Wassermann test. After an introductory chapter on the histological development of the Wassermann test, Boas considers very carefully the technic of the same, together with the various modifications that have been proposed. The substitute precipitation methods are also carefully described. The behavior of the test in the presence of various manifestations of syphilis are accorded considerable attention as well as the antisiphilitic treatment on the reaction. The writer is convinced that a positive Wassermann reaction must be accepted as a symptom of syphilis although the absence of the test cannot be accepted as of decisive value in regard to the prognosis or treatment at the present time. The book is exceedingly timely and worthy of the attention of the profession.

A SHORT PRACTICE OF MIDWIFERY FOR NURSES. BY HENRY JELLET. Fourth Edition Revised. New York. Paul B. Hoeber, 1914. \$2.50 net.

The fourth edition of this manual by the Master of the Dublin Rotunda Hospital, has evidently met with a great deal of attention

as the statement is made that 14,000 copies have thus far been issued. The work details the practice of the Rotunda Hospital and in accordance with the traditions of this well-known institution, Dr. Jellett believes that a book for nurses must include much which is beyond what their everyday practice would at first sight show to be necessary. It is essential therefore that she must acquire a sufficient amount of information on almost all subjects relating to the management of a pregnant, parturient, and puerperal woman. The principal value of this knowledge is that it should not lead her to assume responsibilities which she is unable to discharge. He frankly states that a nurse must remember that her work in life is to be a good nurse and not a bad doctor. Although some of the details of the nursing practice differ from those followed in this country, on the whole, the book will commend itself for the use of American pupil nurses and graduates.

THE STUDENT'S HANDBOOK OF GYNECOLOGY. BY GEORGE ERNEST HERMAN. Second Edition, Revised by the Author with Additions by R. Drummond Maxwell. With 6 color plates and 194 figures in the text. New York, William Wood & Company, 1914. Price \$2.50 net.

The second edition of this valuable little work has been brought up to date by the addition of new matter and several illustrations. This smaller manual is a condensed presentation of Dr. Herman's larger work on "Diseases of Women" from which the explanatory, argumentative and speculative matter, references to rare cases, and descriptions of operations have been omitted. A very satisfactory index completes this excellent manual.

GUNSHOT INJURIES, HOW THEY ARE INFLECTED, THEIR COMPLICATIONS AND TREATMENT. BY COL. LOUIS A. LAGARDE, United States Army Medical Corps (Retired). Prepared under the Direction of the Surgeon General United States Army and Published by Authority of the Secretary of War. New York, William Wood & Company. 1914. Price \$4.00 net.

Since the conclusion of the Civil War no book has appeared to cover the advances in this branch of surgery. Col. Lagarde's work must therefore be regarded as filling a long desired want. The change in the arms used in recent warfare has brought about an entirely different class of wounds. The whole subject is to be regarded as emergency surgery and the civil surgeon must be prepared to understand and appreciate its various features. The civilian surgeon during war must always out-number the regular medical officers and we find that in the medical reserve corps at the present time even gynecologists are included in the roster. Such books as that given to the profession by Major Lagarde are therefore of great value as works of reference.

THE MIDWIFE IN ENGLAND, BEING A STUDY IN ENGLAND OF THE WORKING OF THE ENGLISH MIDWIVES ACT OF 1902. By Carolyn Conant Van Blarcom, R. N. With an introduction by J. Clifton Edgar, M. D. December 1913, New York City.

This excellent presentation of the midwifery conditions in England is worthy of the attention of the American profession. Notwithstanding all that has been done as regards the reading of papers and the presentation of resolutions; little, if anything, of a practical nature has been accomplished. In an introduction to the pamphlet by Prof. Edgar, reference is made to the three standpoints taken in this country in regard to the subject under discussion: First, the midwife must be abolished. Second, the midwife had best be ignored and left to her own devices. Third, the midwife should be raised to a higher plane by proper State control and education. Dr. Edgar believes that the first proposition is impossible until a substitute can be found to care for the 40 per cent. of women now delivered by this agency. The second proposal he considers unworthy of further attention and the third proposition is at the present time the only practical way of dealing with the problem, whether it has for its object solely the temporary safeguarding of women and children or a more far-reaching aim, namely, the final elimination of all but skilled and educated midwives.

Miss Van Blarcom, the executive secretary of the Committee for the Prevention of Blindness, was commissioned to visit England in order to study the workings of the English Midwives Act of 1902, and the report herewith noted is the results of her labors. Although the author is particularly interested in that portion of the midwife activity which is concerned with the prevention of blindness, she has also studied the other aspects of the case. A concise and comprehensive manner characterizes the report which holds up before us a concrete example of how the midwife problem has been successfully solved by another English-speaking country than our own. We are unfortunately, however, much behind England and other European countries, especially Germany, in the attention which we have given to this subject, and the circulation of such reports as this of Miss Von Blarcom will do much to assist in the solution of the problem. Whether it shall be as Dr. Edgar suggests, by a recognition of the midwife and an attempt to thoroughly educate her, or whether it shall be solved by other means, is for the future to decide. As the condition at present exists, however, we as Americans can scarcely feel proud of our results. The conditions are somewhat different in the United States from what they are in England. No Federal Health Law can be enacted here, as such matters are left to the discretion of the individual states. This increases the magnitude and the complexity of the problem but it deserves our attention nevertheless.

THE TRANSACTIONS OF THE EDINBURGH OBSTETRICAL SOCIETY.
Volume xxxviii. Session 1912-1913. Edinburgh: Oliver & Boyd.
1913.

This volume contains the papers read at the various meetings of the Society, including obstetrical, gynecological and one pediatric contribution. A considerable number of these papers have undoubtedly appeared in other journals and it would perhaps have been advisable to note this fact; otherwise, the work is a very effective presentation of the activities of this old established and worthy organization, which numbers among its members the best known men in their particular fields.

OBSTETRICS FOR NURSES. By Joseph B. DeLee, M. D., Professor of Obstetrics in the Northwestern University Medical School, Chicago. New (4th) Edition. 12mo of 508 pages, fully illustrated. Philadelphia and London: W. B. Saunders Company, 1913. Cloth \$2.50.

As the fundamentals of obstetric nursing do not undergo any marked change from year to year, few changes in the text of this edition have been necessary although several additions have been made. A chapter on infant feeding has been thoroughly revised and another on Cesarean section amplified in view of the more generalized performance of the operation. The author aims to present this branch of medicine to nurses in a clear and interesting form and from the circulation which the book has received, the purpose has evidently been fulfilled. The printing, illustrations, and the work are thoroughly satisfactory and a glossary at the end of the work constitutes a very efficient aid to the nurse who desires to use the book as a reference manual.

MEDICAL GYNECOLOGY. By S. Wyllis Bandler, M. D., Adjunct Professor of Diseases of Women, New York Post-Graduate Medical School and Hospital, Third Thoroughly Revised Edition. Octavo of 790 pages, with 150 original illustrations. Philadelphia and London: W. B. Saunders Company, 1914. Cloth \$5.00 net; Half Morocco, \$6.50 net.

One of the chief features in Dr. Bandler's new edition of his generally accepted work is the recognition given to internal secretions in the realm of gynecology. In recent works, especially those of German origin, and in the admirable book by Cushing, many proofs are cited of the close interrelation existing between the genital tract of women and the various internal glands. The author devotes a chapter of many pages to this subject which has emerged from the realm of speculation and the facts of which are now becoming part of the everyday practice of the gynecologist. The practice of gynecology has been generally regarded as almost purely surgical in character and the intent of the volume under consideration shows conclusively that the medical aspects are also of great importance. We find, however, that in many instances resort must be had to surgical measures.

The favorable comments brought out by the first edition may be repeated for the present one which retains all the features that have characterized the previous issues. A very important feature of the work is the question of differential diagnosis, and this is particularly emphasized. A very satisfactory index completes the book.

BRIEF OF CURRENT LITERATURE.

OBSTETRICS

Physiologic Treatment of Congestive Dysmenorrhea.—C. D. Mosher (*Jour. A. M. A.*, 1914, lxii, 1297) says that at present all the evidence points to the menstrual hemorrhage as a secondary matter more or less fixed by the upright position. It is unnecessary and undesirable that it should be of more than brief duration or of more than slight amount. Pain and discomfort, where no organic lesion exists, are readily controllable by the physiologic regulation of the circulation from the abdomen and pelvis back to the heart by the restoration of the tone and action of the abdominal muscles and diaphragm. The coincident functional disturbances in other organs are a result, directly or indirectly, of the undue congestion in the pelvis which has drafted off too much blood from the general circulation leaving other parts, as the digestive area or skin, too depleted to function properly. The congestive headaches, whether they occur at the menstrual or the intermenstrual period, are relieved by the equalizing of the circulation by the following exercises. All tight clothing having been removed, the woman is placed on her back, on a level surface, in the horizontal position. The knees are flexed and the arms are placed at the sides to secure relaxation of the abdominal muscles. One hand is allowed to rest on the abdominal wall without exerting any pressure, to serve as an indicator of the amount of movement. The woman is then directed to see how high she can raise the hand by lifting the abdominal wall; then to see how far the hand will be lowered by the voluntary contraction of the abdominal muscles, the importance of this contraction being especially emphasized. This exercise is repeated ten times, night and morning, in a well-ventilated room, preferably while she is still in bed in her night-clothing. She is cautioned to avoid jerky movements and to strive for a smooth, rhythmical raising and lowering of the abdominal wall. The result of the treatment has been that the pain has been lessened in many cases, and wholly removed in a large number. In women who are habitually free from pain at the menstrual period, but who, on account of some unfavorable condition, have suffered an attack, the pain has been stopped at its onset by these exercises.

Necessity of Conserving Intercostal Nerves in Abdominal Incisions.—E. P. Quain (*Amer. Jour. Surg.*, 1914, xxviii, 133) describes a series of experiments with dogs and rabbits as a result of which he

concludes that a destruction of the intercostal nerves without trauma to the peritoneum does not cause any macroscopic change in the peritoneum. A perfect healing of a mildly traumatized peritoneum may occur after the intercostal nerve supply has been severed. If a weak irritant or infection be added to the trauma, the serosa may still recuperate. But if a peritoneal surface deprived of its intercostal nerve supply be subjected to a trauma, or to a trauma plus infection or irritation, such as may obtain during an operation, more adhesions and a more chronic infiltration of the peritoneum is likely to follow than if the same injuries were inflicted on a peritoneum with normal nerve supply.

Hypophyseal Opothrapy in Gynecology.—F. Jayle (*la Presse méd.*, April 1, 1914) has used a solution made from the dried and powdered posterior lobe of the hypophysis of the cow. He made his injections subcutaneously in the back of the thighs or abdomen every other day. The immediate effects are feelings of fatigue, colic, headache, and insomnia. The results are lessening of leukorrhea, of abdominal pains, of constipation, and rheumatic pains in the limbs. There are no longer clots in the menstrual flow, and menstruation is made regular, and if profuse is lessened in amount. He has treated only chronic diseases without fever, metritis, subinvolution with metrorrhagia, uterine sclerosis of the menopause, chronic salpingitis, and oophoritis, fibroma, and inoperable epithelioma of the cervix with hemorrhage. The author recommends this treatment both for its immediate and remote results. It is especially useful at the menopause, and complementary to conservative surgical operations. It replaces radiotherapy and electrotherapy. Its action is complex. There is a vascular contraction, and the ovary is especially influenced by the administration of the hypophysis. The author has treated fifty patients in all, and gives histories of ten typical cases.

Treatment of Severe Menstrual Pain and Excessive Bleeding by X-rays.—F. Hernaman-Johnson (*Practitioner*, 1914, xcii, 716) says of this method of treatment that hemorrhage is more quickly relieved than other symptoms. The period immediately succeeding the commencement of treatment is no better, and may be worse than usual. The second period is delayed. It will probably show slight improvement, but more attention should be paid to the patient's feelings during the interval. If she has felt even a little better, it is worth going on. During the second interval, there should be a distinct advance, and the third period ought to be less severe than usual. Improvement, once started, will continue for some months after x-rays have been discontinued. The writer gives the technical details of the treatment which he thinks does not produce sterility. He goes so far, in fact, as to state that it is doubtful whether even the heaviest therapeutic doses can cause more than temporary barrenness excepting in women near the menopause.

Diagnosis and Treatment of Sterility.—The method recommended by M. Hühner (*Med. Rec.*, May 9, 1914) consists in examining specimens of mucus taken at various times after coitus from the vagina, cervix, and fundus uteri, and examing these for live and dead

spermatozoa. The wife presents herself as soon as possible after coitus, and specimens are taken from the mucus of various portions of the genital tract. If live spermatozoa are found in the cervical mucus we can absolve the husband from all responsibility. If dead spermatozoa are found in the cervical mucus, it is safer to obtain a condom specimen to see whether they came out dead or were killed by the woman's secretions. If after careful examination we find spermatozoa in the cervix but never beyond the internal os or angle of flexion in an anteflexed uterus, we may conclude that the flexion is the cause of the sterility as far as can be determined, and a dilatation and curettage are then indicated. If we find lively spermatozoa in the body of the uterus we may conclude that no matter how acute the flexion it is not the cause of the sterility. In all probability the sterility in such case is due to one of two conditions, either an undeveloped or infantile uterus, which cannot support a growing fetus, or to some trouble higher up, such as either a stenosis of the tubes or some ovarian trouble. The condition of the uterus can be determined from the local examination, with the special precaution not to depend entirely upon palpation, but to determine the size of the uterus by the uterine sound. In determining the condition of the uterus by the uterine sound we must determine how much is cervix and how much is body. If almost the entire uterus is made up of cervix such a uterus (unless the body can be developed) is obviously unfit for impregnation. If, however, we find a perfectly well-developed uterus containing live spermatozoa several days after coitus (in the fundus), and if nothing wrong is found on palpation in the adnexa, we may then conclude that there is some stenosis of the tubes or some other pelvic condition not appreciated by palpation, and it is then, and then only, that a laparotomy may be considered and be justifiable. If we find dead spermatozoa in the body of the uterus, and live ones in the cervix, we may conclude that it is the condition of the uterine endometrium that has killed the spermatozoa. In this case a curettage would be indicated. We must also remember that the endometritis may be the result of a flexion or displacement of the uterus and direct our treatment accordingly. If no spermatozoa at all are found in any portion of the genital tract, or only dead ones are found in the vagina, but none at all in the cervix, the fault may be either with the husband or the wife. We then request a condom specimen, and if live, active spermatozoa are found therein, the fault may still be with the husband or with the wife. It may be the case of a normal penis with an abnormal position of the cervix, such as a long, conical cervix, a very short cervix, or a cervix pulled out of position by adhesions or otherwise dislocated. Again there may be in the male organ a condition of hypospadias, epispadias, or stricture of the urethra, or any of the functional sexual disorders, such as premature ejaculation, etc. As long as no spermatozoa are found in the cervix it is always advisable to examine the husband, no matter what we may find in the condom specimen. The writer discusses also the treatment of sterility due to the condition of the male. He says that we ought not to give an

absolutely bad prognosis, except where the husband has no spermatozoa at all. It is not by any means rare for a woman to conceive after years of sterility, even where everything had apparently been done for relief without result, and where all hope and treatment had been abandoned for years. Nor is it rare to find a very small uterus that on examination seems positively too small for maternity, develop without any treatment, and the patient conceive afterward.

Nephroptosis: Its Relation to Mental Disorders.—The conclusions of K. M. Pardhy (*Practitioner*, 1914, xcii, 527) are based upon nephropexy performed upon 415 patients, in 396 of whom both kidneys were fixed. The majority of patients suffered more or less from neurasthenia, either mainly or in addition to, digestive, genito urinary, and local symptoms, or various neuroses, *e.g.*, severe headaches, tachycardia, asthma, hemicrania, etc. The writer's remarks, deal, however, with nephroptosis in relation to definite and marked mental disorders, *e.g.*, severe melancholia, with or without delusions, insanity, and mania. He has performed nephropexy upon twenty-five patients of this type. He says that nephroptosis may cause serious vascular and ureteral obstruction and interference with the normal function of the kidney, which when often repeated causes varying degrees of dilatation of the calyces or pelvis, flattening of pyramids, hydronephrosis, loss of kidney substance, and cystic degeneration. This may lead to autointoxication, causing, among other things, destruction or impaired function of the cerebral cells, and mental disorders. It is possible that the local effects of nephroptosis—backache, pain over the distribution of the last dorsal nerve, colitis, constipation, flatulence, etc.—contribute toward bringing on mental disorders. But that this is a very small factor is evident from the large number of cases in which no such local symptoms have been present, but the mental disorder was the most marked feature, and nephropexy cured it. Nephropexy is the proper and rational procedure in cases of mental disorders, when movable kidney is present, and the only contraindications are those to be cited against any major operation. Nephropexy, to be of full benefit, must be performed properly and efficiently. Fixation of the kidneys anyhow or anywhere will often result in more harm than good. The chances of cure of the mental disorder after nephropexy he estimates at not less than 50 per cent. Even if fixing up the kidney does not cure the complaint, it cannot in any sense make the patient worse. The patient should be watched and taken care of for a prolonged period till the cure is established. The poorer class of patients should either be sent to an asylum soon after the operation, or be operated on in an asylum, so that they can be taken care of efficiently.

Ascending Infection of the Kidneys.—J. E. Sweet and L. F. Stewart (*Surg. Gyn. and Obst.*, 1914, xviii, 460) describe their experimental anastomoses of the ureter with the bowel. They conclude that an extensive network of lymph vessels and channels exists in the mucosa and submucosa, in the external coats of the bladder and the ureters, and in the entire structure of the kidney. This network

in the ureter anastomoses freely with the lymphatics of the bladder at the one end, and with the lymph apparatus of the kidney at the other end. An ascending infection travels through this lymphatic system, not through the blood-vessels of the ureter nor through the lumen of the ureter. (a) The blood-vessels can be excluded, because the veins of the bladder and the veins of the ureter, for the greater part, open into the general venous system, not into the venous system of the kidney. (b) The lumen of the ureter can be excluded, because if the lumen be open to infection, the infectious process is traceable in the lymphatic system, not along the mucosa of the ureter. If the lumen be closed to infection, the process extends to the kidney in the usual way; if the lumen be open to infection, but the lymphatics not in contact with virulent infection, as when the ureter is passed through the pancreatic duct, there is no ascending infection; if the lumen be open, but the continuity of the lymphatics be interrupted, infection does not ascend; and finally, if the kidney pelvis be directly connected with the gut, the general infection, characteristic of an ascending infection of the kidney, does not occur. From the point of view of the practical surgeon, it would seem that these results would be of service in the consideration of the possibilities of any infectious process involving the lower genitourinary tract or the pelvic organs in general; certainly the cystoscopist must transfer his attention from the general question of cystitis to the particular one of the local lesions caused by the cystitis, their extent and location. The possibility of the effective local treatment of ulcerated processes of the bladder is also suggestive. The results of this work upon the general question of the anastomosis of the ureters with the bowel would not seem to hold out much promise. In the writers' hands, every attempt thus far has been blocked by the ease and rapidity with which the infection enters the lymphatic system of the ureter.

Heart Massage in Resuscitation of Still-born Infants.—R. E. La Rue (*Pediatrics*, 1914, xxvi, 126) says that the class of cases in which heart massage is of especial value are those in which the infant is pulseless and apparently dead when born, where any method of artificial respiration would be useless because the heart had ceased to beat. The procedure which he recommends, is best carried out with the infant lying upon its back in a wide basin filled with sufficient water at a temperature of 110° to 120° F., to completely cover the body, the head supported so that no water can enter the mouth or nose. Using both hands, grasp the body of the infant in such a manner that the thumbs rest upon the anterior surface of the chest, the fingers extending across the back, as in the Schultze method of artificial respiration. The thumb of the left hand should cover the third intercostal space almost against the left border of the sternum, while the right thumb is placed over the fourth intercostal space directly in the mammary line. Make deep pressure, first with the right thumb, which forces the blood out of both ventricles; from the right ventricle through the pulmonary artery to the lungs, and from the left ventricle through the aorta to the arteries of the body;

then with the left thumb, causing both auricles to contract and forcing their blood into the ventricles. This alternate pressure should be made at the rate of one hundred per minute, until the heart is distinctly felt to beat of its own accord, then it is safe to start artificial respiration efforts.

GYNECOLOGY AND ABDOMINAL SURGERY.

Drainage Tube in Abdominal Surgery.—From his previously published experimental work J. E. Adams (*Lancet*, Apr. 25, 1914) concludes that, owing to the adhesions which rapidly form around drainage tubes their value is distinctly limited in the treatment of peritoneal infections. Since the tissues of the abdominal wall possess a much lower degree of resistance than the peritoneum, drainage of the former may frequently be called for where drainage of the peritoneum is not necessary. The presence and pressure of a drainage-tube in peritonitis may determine the transudation of organisms from the lumen of the gut to the peritoneal cavity.

Röntgen Treatment of Myomata of the Uterus.—According to Krönig (*Surg. Gyn. and Obst.*, 1914, xviii, 529) Röntgen treatment is indicated for myomata in all cases of women of forty years or over in place of the total extirpation of the genital organs or in place of the supravaginal removal of the uterus. This Röntgen treatment is preferable, first, because it causes no deaths; second, because it can be used even after serious weakening from the loss of blood, and in cases of heart troubles. The disadvantages of this mode of treatment are the greater expense and the longer time required by from six to eight treatments extending over a period of three to four months. In cases of younger women whose menstruation and fertility must be preserved, we prefer operation and enucleation, where possible, to Röntgen treatment. As permanent success can be looked for only in cases where the tumors are isolated, there arise a large number of cases in which even in women under forty Röntgen treatment is indicated in preference to operation. Röntgen treatment harbors a certain danger that arises from uncertainty of diagnosis. Ovarian tumors cannot be reached by Röntgen treatment and must be excluded. In some cases tumors of the uterus have grown together with tumors of the ovaries, making differential diagnosis impossible. In these cases operations must be performed. Another difficulty arises from mixed tumors where myoma exist in combination with sarcoma or carcinoma. Carcinomata, arising from the mucous membrane, as they do, can be revealed by curettage and microscopic examination. Sarcoma of the wall cannot be diagnosed by curettage, but sarcoma occurs only in 1 per cent. of all cases of tumors of the uterus and it is by no means uncertain that Röntgen treatment will not influence sarcoma cells in exactly the same way as the myoma cells. Röntgen rays and radium, while valuable and effective, are also dangerous, when used without proper precautions.

Conservative Tendency of Operation in Myoma Uteri.—W. Falgowski (*Rev. de gyn. et de Chir. abd.*, April, 1914) says that in con-

sidering the success of the x-ray treatment of myoma uteri it becomes necessary to ask whether operation is ever justified. But x-ray treatment is long and expensive, at the same time that the final result is uncertain. It is not always possible to tell the condition of the other pelvic organs, which may be diseased and demand operation. Out of seventy-eight cases of myoma operated on by the author there were six of pyosalpinx or tumors of the adnexa. Malignant transformation of the tumor would render x-ray treatment useless. In two of the author's cases the myoma had become malignant. Adherent tumors of the adnexa may stimulate myoma, and here the rays would be valueless. The opening of the abdomen alone will give a perfect diagnosis. Operation with good technic and proper diagnosis leads to a sure cure without mortality or morbidity. Of the 78 operated cases all are alive. In 28 old women the uterus was amputated, in 7 others conditions necessitated radical operations. In 3 young women a supravaginal amputation was done to preserve their sexual functions without pregnancy. The remaining 40 cases, under 37 years of age, were operated upon conservatively, and 21 continued to menstruate regularly. Of these, 41 were operated by the abdominal, 37 by the vaginal route. Conservative operation dictates leaving of a part of the uterus whenever possible. The author had never had a return of myoma after operation. He concludes that in spite of the success of the rays operative treatment merits special attention, since mortality has been reduced to nothing.

ITEM

The Los Angeles Obstetrical Society held its inaugural meeting on March 25, 1914. The Society is limited to fifty members and there is already a waiting list. The officers are *Dr. Titian J. Coffee*, President, and *Dr. George E. Marlsbury*, Secretary.

DEPARTMENT OF PEDIATRICS.

ORIGINAL COMMUNICATIONS.

THE PATHOLOGY AND PROPHYLAXIS OF RICKETS.

BY

JOSEPH E. WINTERS, M. D.,

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New York.

RICKETS is disordered nutrition. The most obvious and obtrusive change is retarded, erratic ossification. Suspension of assimilation of salts is the cause. Normal bone has 63 parts inorganic, 37 parts organic material. Rachitis bone 21 parts inorganic, 79 parts organic material. Its specific gravity is one-seventh to one-eighth of that of normal bone.

At junction of epiphysis and diaphysis of normal bone, cartilage cells are in completely straight tiers of six, eight, or ten. Between each column is a definite line of salts. Rows of cartilage cells, and an intervening line of salts, are mathematically regular. This layer of growing bone is one twenty-fourth of an inch in thickness.

In rickets, superimposed cartilage cells are fifty or sixty in each column. The columns are distorted and irregular. There is a mere sprinkling of salts *in isolated nuclei*. This layer is $\frac{1}{4}$ to $\frac{1}{2}$ an inch in thickness.

Exuberance of cartilage cells, and *sparsely scattered islets of salts*, are the anatomical signs of rickets. The sole primary *pathological condition of rickets, is nonassimilation of salts in food*.

Whatsoever inhibits assimilation of salts in food, causes rickets. That which insures assimilation of salts in food, prevents and cures rickets.

Salts in food to be assimilated must be in organic synthesis with protein. In every food produced in the laboratory of nature, salts are in *organic* synthesis with protein. This is the antirachitic element in food. Disintegrate the synthesis of the great laboratory of nature, and every food is a rachitic food.

Extremest rickets follows condensed milk as the only food for a

prolonged period. For evaporation and condensation, milk is subjected to prolonged high temperature. Nature's synthesis of salts with protein is disintegrated.

Precipitate salts from milk. Add these again to all the other constituents of milk. Feed this to young animals for whom milk is a sufficient and a perfect food. They eventually die of inanition. *The unequivocal, anatomical sign of rickets is in every bone.*

Condensed, evaporated, desiccated, milk, whey powder, every powdered dry preparation of milk is a rachitic food.

Rickets may be present in any degree from just perceptible beading of ribs, to horrible deformity of entire bony framework. In milk, synthesis of salts with protein is light and easily impaired. Heat according to the degree and duration *impairs* or *disintegrates* this synthesis. Synthetic impairment, as in pasteurization, and synthetic disintegration, as in condensation, cause different degrees of the same pathological condition. Pasteurized milk is a rachitis food. Incipient, but positive rickets accompanies cereal feeding in *young* infants. Diastatic ferments are in abeyance, during that which, by physiological edict, is the milk period. During period of total absence of amylolytic ferments, and of their gradual development between the second and sixth months, assimilation of salts is inhibited by barley, granum, or any cereal. Salt curtailment causes rickets. At this early age rickets is commonly marked by anemia, catarrh of mucous membranes, laryngismus stridulus, carpopedal contractions, or general convulsions.

A child fed on condensed milk may be grossly fat and profoundly rachitic. With cereals, extremely emaciated and markedly rachitic.

With dry preparations of milk, malnutrition and rickets may be equally notable and obtrusive. With cereal as diluent of milk impairment of nutrition may be inconsiderable, rickets just decipherable. Wheat flour, potash, and extract of malt, cooked together, under the alluring name of malt soup, has been productive of a prodigious amount of unrecognized, small rickets. Cereal dextrose, glucose, maltose, malt soup, inhibit assimilation of salts in young infants, and favor rickets.

Rickets and Cow's milk, with *Unimpaired Antirachitic Element.*

The unfounded assumption that large masses and bean-like masses in infant's stools were not casein, but fat, was most pernicious. Talbot, Southworth, Schloss, and others, adduced conclusive scientific proof that these curds contain casein. The science of feeding was turned backward by this groundless assertion. The sequel was, skimmed milk, random, haphazard, hit or miss,

modification of milk. Consequent upon this impossible food, there ensued indiscriminate recourse to patented foods.

Of 200 feeding cases that came to the Vanderbilt Clinic Infants' Station, the *feeding previously prescribed by a physician*, 162 ordered one of the patented foods. The stultifying patented foods were a derision to all advanced pediatricists, until they were the forced alternative for that portion of milk which is used in making skimmed cheese—so tough and leathery that it is eaten only by Italian laborers.

These curds are formed in the stomach. When milk enters the infant's stomach, casein is precipitated and forms a solid clot. Digestion of protein is by gradual erosion. Therefore, the young infant cannot digest protein, unless it is in finely divided flocks, that there may be innumerable points of catalytic action of enzymes.

Precipitated casein enmeshes the fat; the coating of casein precludes action of lyptolytic enzymes; efficient action of proteolytic enzymes, and of lyptolytic enzymes, is thwarted by these curds.

Neglect of physical behavior of protein superinduces rickets. Skimmed milk, when diluted with water and lime water as for feeding, and acidulated at feeding temperature, yields a few large, tough curds, which on stirring, stick together and sink.

The upper 7, 8, or 10 ounces, from a quart bottle of milk, sixteen hours after milking, treated in this manner, gave a coarsely flocculent, floating curd, which could be broken up by stirring, but only with some difficulty, and quickly collected into large masses again. Protein masses caused intestinal irritation and diarrhea. Protein is drained off before time for assimilation. Protein contains the salts. Neglect of physical behavior of protein precludes salt assimilation.

Paucity of salts causes rickets.

Centrifugal cream is the only available market cream. The constituent products of centrifuged milk are fat-free protein, and protein free fat. Centrifugal cream is protein free, therefore salt free. Suspension of salts causes rickets. Salt starvation of centrifugal cream was erroneously diagnosticated, fat indigestion, fat poisoning.

Skimmed milk, whole milk, upper 7, 8 or 10 ounces from quart bottle of milk, separately, or in combination with centrifugal cream, are rachitic foods.

RICKETS AND FAT.

Salts of calcium and magnesium are difficult of absorption. Free alkalies of the intestinal secretions split up neutral fats into

glycerine and fatty acids. Fatty acids saponify salts of calcium and magnesium and thus render them readily absorbable. Ample fat is requisite for salt assimilation for the prevention and cure of rickets.

DIGESTION OF PROTEIN; DIGESTION OF FAT MADE FACILE.

Top 1/2 ounce from quart bottle of milk sixteen hours after milking, diluted with water and lime water as for feeding and acidulated at feeding temperature, yields an immense number of finely divided, light feathery flocks, which float in solution, and are easily reduced to semiemulsified condition by stirring.

Erosive action of proteolytic enzymes is perfect, ideal. Fat is not immured; action of lipolytic enzymes untrammelled; salt retention complete.

Erosive catalytic action of proteolytic enzymes; emulsification of fats by lipolytic enzymes; retention of salts, is dependent upon and determined by physical behavior of protein.

The prophylaxis of rickets, the key to all the enigmas of feeding is to be sought in the physical behavior of protein.

Disregard of physical behavior of protein, is as preposterous as giving solid food before dentition.

RICKETS IN BREAST-FED CHILDREN.

Proportion of salts in human milk diminishes progressively with increasing age of the mother; they diminish progressively after the sixth or seventh month of lactation; there is diminution with frequent pregnancies, and when pregnancy occurs during lactation, there is early marked decrease. When mother's milk, owing to prolonged lactation, advanced age, constitutional feebleness, frequent pregnancies, or pregnancy during lactation, becomes poor in salts *salt famine may cause rickets.*

SYPHILIS, TUBERCULOSIS, MALHYGIENE, ALL ALLEGED CAUSES OF RICKETS.

A syphilitic infant, nursed exclusively by a vigorous young mother, never becomes rachitic. On rachitic food, a syphilitic infant seldom survives a sufficient period for rickets to develop.

TUBERCULOSIS.

A child born of tuberculous parents, nursed exclusively by a healthy young wet-nurse, does not become rachitic, even though

tuberculosis develop. On rachitic food, an infant with tuberculosis, will almost surely succumb before there is time for rickets to develop.

MALHYGIENE.

Under most pestiferous hygiene a child nursed exclusively by a healthy young mother never becomes rachitic. Severe, acute rickets, in a squalid den, may be cured by supplying abundance of good breast milk, without modification of hygiene.

Syphilis, tuberculosis, malhygiene, predispose to, but do not cause rickets.

The sole essential factor, that which alone can cause rickets, is the food factor. Rickets never develops except with rachitic food. Taint free; hygiene faultless; food rachitic, a child invariably becomes rachitic.

The master's child in the mansion, family history unquestioned, hygiene Utopian with haphazard feeding, dies of extreme rickets, or, it ends in rachitic dwarfism, with unsightly, irremediable deformities, and is shackled and handicapped for life.

His servant's child, hygiene execrable, with an abundance of good breast milk, is a joyous specimen of child life; makes a robust man, of enviable physique.

Studies in zoological gardens have demonstrated that rickets in young animals in captivity is always due to food which inhibits assimilation of salts. It is always cured by food which insures assimilation of ample salts, without change of environment. The sole etiological factor of rickets in infants and young animals is wrong food. Malhygiene never causes rickets when feeding is correct.

25 WEST THIRTY-SEVENTH STREET.

SPECIAL TRAINING IN PEDIATRICS.

BY

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IN spite of the great progress pediatrics has made, there are still practitioners of medicine who are under the impression that an infant is a little man or woman and that diseases of infancy and childhood are the same as diseases of adult life and the treatment consists in giving the same medicines but a little less. That such a misconception should still exist is really amazing.

Such erroneous views necessarily, lead to wrong diagnoses and faulty treatment in diseases of children, and the fact that some children survive both the diagnoses and the treatment is not to the physician's credit.

That there are diseases peculiar to infancy and childhood which cannot be readily interpreted into terms of general medicine is too obvious to any one who bears in mind the vicissitudes of life from infancy to puberty.

During intrauterine life the fetus is surrounded by a body temperature and carries on a passive life at the expense of its mother. At birth, it is suddenly thrust into new world and almost instantaneously it begins to lead an active and independent life. The collapsed lungs expand and respiration is established. The circulation assumes a different course. Food is taken through the mouth and passes along the gastrointestinal tract, and the kidneys function properly.

The greatest anatomic and physiologic progress is made during the first year. Every cell of the body is working at high speed.

The infant at birth has an average length of 20 1/2 inches. During the first year it gains about 8 inches. Never does it gain so much later in life in a single year. The circumference of the head at birth is about 13 inches. At the end of the first year it is about 18 inches, a gain of about 5 inches in one year, which never happens later in life. It gains in weight during the first year about 13 pounds never showing such a record later during childhood. At the end of the first year the child has about six teeth, can hold up its head and is able to sit. In one year it emerges from the state of total helplessness of infancy to the physical and mental vigor of childhood.

In order to be able to carry on such rapid anabolic work, the infant must be supplied with plenty of food which needs no sterilization or pasteurization. The only source for such ideal food is in its mother's breasts. But not every child is so fortunate as to have its birth-right food and here only a trained pediatrician can prescribe a substitute food, which is by no means an easy matter, and is at best artificial and imperfect.

While during the period of childhood growth and development is not so rapid as during the period of infancy, still it is an exceedingly active period of life preparing the child for manhood or womanhood. The supervision and advice of a trained pediatrician is again of paramount importance.

Considering the sudden change from intrauterine to extrauterine life and the rapidly changing conditions from infancy to childhood

and from childhood to adult life there is no wonder that there are occasional deviations from the normal physiological course.

While a child is subject to almost all diseases of adult life it may have a number of diseases peculiarly its own. The congenital anatomic and hereditary diseases are of great importance as to diagnosis and treatment. The nutritional disorders are difficult to treat. The disturbances and diseases of the nervous system and the internal secretory organs require a thorough knowledge of pediatrics for their diagnoses and treatment. The instability of the temperature in a young child is very striking, for the slightest disturbance may cause a rise in temperature out of proportion to the pathologic condition. This makes the diagnosis of the infectious diseases more difficult. The physical examination in children is characteristic in many ways. Finally, infants and young children cannot help the physician to arrive at a diagnosis. The sick child appeals for help but is unable to tell where the trouble lies. The history obtained from the mother is not always reliable and is at best only the result of her observation and impressions.

In order to treat children's diseases intelligently, one must know know infancy and childhood in health and disease.

The following are a few of the common errors in the diagnosis of children's diseases.

Teething.—This diagnosis is made for almost every disease of infancy and childhood.

A Cold on the Chest.—A chest cold as a diagnosis is commonly made when a proper examination would change the diagnosis to bronchitis, or pneumonia or tuberculosis.

A touch of consumption, a touch of pneumonia, a touch of the grippe, a touch of appendicitis and many other touch diseases is common as a diagnosis among a certain class of physicians.

Rheumatism on the Heart.—Many congenital heart lesions have been diagnosed as rheumatic endocarditis.

Rheumatism.—Almost every ache has been diagnosed as rheumatism, specially scurvy.

A Weak Child.—Under this indefinite diagnosis one usually finds cases of rickets, encephalitis, amaurotic family idiocy, Mongolian idiocy and what not. "Will outgrow" is the prognosis.

To do justice to our little patients, pediatrics should be made the study of a lifetime.

TRANSACTIONS OF THE MEDICAL SOCIETY OF THE STATE OF NEW YORK

SECTION ON PEDIATRICS.

Meeting Held April 28, 29, and 30, 1914.

THE INFLUENCE OF DIET ON THE GROWTH AND RECURRENCE OF ADENOIDS.

DR. FRANK VAN DER BOGERT, Schenectady.—To judge from personal experience, hospital records and public opinion there seems to be an undeniable increase in the frequency of adenoids. It hardly seems reasonable to suppose that the great prevalence of adenoids is but apparent. It is only by a thorough knowledge of causal factors that we can hope for prevention. Our present knowledge as to the etiology of adenoids is exceedingly meager and theoretical. Practically all authorities attribute much to the so-called lymphatic diathesis, and without this constitutional predisposition it would be hard to account for the congenital cases. The lymphatic diathesis itself must be due to an underlying cause either in the affected individual or his progenitors. Rachitis seems to play an important part in the etiology of adenoids and as a more direct and exciting cause, catarrhal affections of the nose and nasopharynx are accused, though it is impossible to say whether these catarrhal affections are a cause or an effect. Bacterial infection of the nose, mouth and throat are considered, and the frequent association of tuberculosis had been noted, but should probably be considered secondary. We must realize the danger of considering congenital the cases seen in the early months of life, in which the condition might not have been present at birth, but brought about by causes operating immediately after birth. My personal experience in cases developing in the early months of infancy would lead me to believe that even at this period dietetic errors and gastrointestinal disorders have some bearing. So far I have been unable to find a record in which digital examination has demonstrated the presence of adenoids at birth; without such demonstration their congenital occurrence is not proven, and the finding of the growths at a later period might justly be considered as due to environment as well as to heredity, since the parents were in all probability reared in the same conditions of diet and hygiene. As rickets is distinctly a nutritional disorder and accompanied with marked catarrhal symptoms of the mucous membrane generally, it seems not un-

reasonable to suppose it capable of causing sufficient irritation of the nasal pharynx to bring about an increase susceptibility to growth of adenoid tissue. If one nutritional disease could have this effect others might have it as well.

As to the importance of coryza, postnasal, and pharyngeal conditions, if they were to be considered as causes and not as effect, we have only to argue that these conditions do not develop in normal individuals, but that there must be a lack of vitality or a lack of resistance in the parts involved to account for their development. This lack of resistance to a common cold is preëminently found in the gastroenterics. My observations have convinced me that much can be done by dietetic methods of treatment in the way of inhibiting excessive growth and preventing recurrence. Naturally when a growth has reached proportions sufficient to cause obstructive symptoms, operation is required. The great difficulty in establishing a causal relation between digestive disorders and the tendency to growth and recurrence of adenoids lies in the fact that the great majority of children are badly fed and that for this reason one felt hardly justified in drawing marked conclusions. In my experience the severe cases of adenoid growths have been found in children suffering from more marked types of chronic intestinal disturbances, and the tendency to recurrence seems more common in this type of cases. It is practically only in those whose dietetic errors have led to distinct catarrhal symptoms of the alimentary tract that large adenoid growths are found. Adenoids may be compared to polyps or to the ordinary skin wart. The polyp is probably due to the irritation of a chronic rhinitis, and the wart to an infection, but there must be an underlying cause else a polyp would be expected to develop in every case of rhinitis and infection would occur with sufficient frequency to preclude any doubt as to the infectious origin of warts. Recently a case came under my observation showing marked nervous and digestive symptoms which had not been relieved by removal of adenoids, and exhibiting a wart on the hand. Another case upon which I operated with no apparent improvement, showed a history of between-meals eating with the continuance of the bad habits after the operation. Judging from carefully taken histories the determining dietetic factor seemed in many cases to originate in early infancy. Irregular nursing and early weaning as well as prolonged nursing seemed to exercise a marked influence. In later childhood irregular and between-meals eating was exceedingly commonly noted in the histories and the excesses in the direction of starches and sweets were most prevalent. Upon examination these children show emaciation, distended abdomen, with bloating and stomach aches, anemia, coated tongue, constipation, or a record of having taken much physic, asthma, not relieved by operation, bed wetting, indicanuria, carious teeth. All these symptoms must be admitted to possibly be dependent upon the presence of the growth, either through local irritation or through the production of obstructive symptoms or a general toxemia. The frequent failure to obtain relief from symptoms by operation and the fre-

quency of recurrence of the adenoids must leave room for doubt. Temporary relief usually follows operation, but without appropriate after-treatment the general ill-health often recurs, and it is to the intestinal tract that I want to direct at least a part of this after-treatment. The essayist cited cases illustrating three points to which he wished to draw attention, namely, bad dietetic histories, failure to obtain by operation relief of general symptoms, and improvement under proper dietetic régime in cases in which symptoms have persisted or growths have recurred.

DISCUSSION.

DR. WILLIAM L. CULBERT, New York.—In my opinion nasal infection is a primary factor in the causation of adenoids. It is important to attend to the digestive tract, but it should be remembered that the child lives on air as well as on food. Air is really more necessary than food. Recurrence is bound to take place unless the child has a proper respiratory development. Spraying the nose is as necessary a part of cleanliness as the proper care of the mouth and teeth. If the child breathes through the mouth, the air is taken into the lungs unmoistened, unfiltered, and unwarmed. With proper breathing habits and breathing exercises the nasopharyngeal space is developed so that it can better fulfill its function. Dr. van der Bogert said that adenoids recurred oftener in young children than in older ones; this is true and the reason is because the young children cannot be taught to develop the respiratory apparatus, but children three or four years of age can be taught proper breathing. In some instances in children with small adenoids operation may be obviated by proper training in breathing. As to infection, germs are breathed in the air and lodge in the mucous membrane of the nose and it is only a question of time until they set up purulent secretion, which frequently leads to ear or sinus trouble. Children should be taught to blow the nose properly, one nostril at a time, holding the other shut, and not blowing too hard. It is thought by some that young children do not have the sinuses sufficiently developed to have sinus trouble, but in some children they do develop early. I have skiagraphs showing them developed in a number of children at one or two years of age.

To guard the sinuses from infection the child should begin in early childhood to breathe properly. This was of equal importance with the care of the digestion and the care of the digestion was of equal importance with proper breathing. It is most injurious to allow a child to suck the thumb or a comforter. The thumb sucking is the more injurious of the two as the thumb has more of a tendency to pull the palatine arch out. I have a woman who takes these little patients for me and teaches them proper breathing.

DR. EMIL MAYER, New York.—I cannot accept in its entirety the statement that errors in diet are responsible for the recurrence of adenoids. In the first instance I would say that congenital adenoids

do exist; that in a large clinic where I see many infants sent me by Dr. Schwartz, Dr. Heinman, Dr. Welt, Dr. Wachenheim, and others I find adenoids in very young infants. In fact, the youngest child I ever saw operated on was seven days old, and surely in this short time errors in diet could hardly have anything to do with the mass in the pharynx. I invariably state to the parents that the operated baby will surely require an operation at the age of four or five years, and this I have seen occur. I can hardly then accept the theory but would like to revise it thus: A child with adenoids has masses of catarrhal secretion pouring into his pharynx and thence into his stomach, and these masses prevent the digestive activity and thus we have disturbances of nutrition. In a long life of observation of adenoid operations, amounting to many thousands, I can say that recurrence is not the rule but the exception. I would say that in all these the recurrence is due to a lymphoid tendency of a hereditary nature.

DR. CARL G. LEO-WOLF, Niagara.—In the case of congenital adenoids we should always think of congenital syphilis even if we do not go as far as Neufan, who says that adenoids in children under three months of age are always due to syphilis. Recurrence of adenoids after operation will be obviated by systematic washing out of the nasopharynx as advised by Dr. Abraham Jacobi years ago. If adenoids are due to the lymphatic diathesis then they can be prevented by a vegetable diet, and this has been proved to be beneficial in a number of cases.

SOME MANIFESTATIONS OF INFLUENZA IN YOUNG CHILDREN.

DR. L. EMMETT HOLT, New York.—It is with some hesitation that one ventures to present a paper on so trite a subject as influenza, a term so widely used as a cloak for ignorance of the explanation of obscure symptoms. I believe, however, that we are now in a position to clear up some of the haze which surrounds this subject and to chart some points at least in this indefinite sea of symptoms. By influenza we mean an infection or inflammation due to Pfeiffer's bacillus and only in this sense is the term used in this paper. The organism affects more frequently the lower respiratory tract, the trachea, bronchi, and lungs, less frequently the upper respiratory tract, the nasopharynx and the ears. To apply the term influenza to an ordinary severe head cold is a misnomer. The *B. influenzae* has not a high degree of virulence, but it may be virulent in exceptional instances causing general blood infection, meningitis, more rarely joint inflammations. The diagnosis is established only by finding the organism. A diagnosis by the examination of smears is unreliable; only cultures can be depended upon. It should be remembered that the *B. influenzae* grows only upon media containing hemoglobin so that cultures made upon ordinary diphtheria tubes are of no value. The difficulties of isolating the organism are considerable and hence it is not surprising that so few observations upon the definite diagnosis of influenza have been made.

In the Babies' Hospital during the past five years we have examined 1650 sputum cultures from 1053 patients during the winter and spring seasons. The chart presented shows the percentage of cases in which the different organisms, the pneumococcus, the streptococcus, the staphylococcus, and *B. influenza* have been present. While there was a general correspondence for the different years there has been an unusual prevalence of the influenza during the present season. This has been particularly true of the months of March and April. Our observations for the past five years indicate that the influenza begins as the cold weather approaches, but that it is not very frequent until after January. The spring months are the time when it is most often seen. It disappears regularly with the advent of warm weather, about the middle of May. Pneumococcus infections do not follow the same course but are common during the year. The pathogenicity of the organism is now quite generally recognized. The *B. influenza* is only one of the common organisms associated with respiratory infections. It is seldom seen alone and it is therefore difficult to determine exactly which of the symptoms present may fairly be attributed to it. It is only in the study of a large number of cases that this point can be settled. Probably the most significant manifestation of influenza is the peculiar range of temperature. The variations seen are most puzzling and frequently wrongly interpreted. They often give the physician the greatest concern, especially since they occur so frequently in the course of pneumonia or otitis, they may lead to the suspicion that some serious complication either medical or surgical may be present. The temperature is apt to be high and to fluctuate widely and irregularly without apparent cause. Its rise is sharp but without chills; in its fall, which is quite rapid, it frequently goes to subnormal. The want of correspondence between the general symptoms and the temperature is quite diagnostic. I know of no disease in which such high temperatures are seen with so few general symptoms. From our experience at the Babies' Hospital several definite clinical types stand out:

1. Pneumonias with unusual, often extraordinary fluctuations of temperature, or with a persistence of temperature after physical signs have disappeared.
2. Pneumonias running a protracted course, with slow resolution. Frequently there are recurring attacks.
3. Cases of otitis with very mild catarrhal symptoms but with a temperature quite out of proportion to the general and local symptoms.
4. Cases with very few or no catarrhal symptoms whatever but with a very unusual temperature curve.
5. Unusual temperature curves accompanying tuberculosis and sometimes other diseases.
6. Cases resembling whooping-cough, seen chiefly in older children, seldom in infants.

There are clinical resemblances between whooping cough and influenza which have not been sufficiently appreciated. Influenza

often persists for six or eight weeks and is characterized by a paroxysmal cough which is so like the paroxysms of pertussis as to be indistinguishable at times. Most of the children reported to have recurrent attacks of whooping-cough have in reality suffered from influenza. The blood picture in whooping-cough is quite different from that in influenza. Influenza without catarrhal symptoms is rarely seen and then it has a relatively low leukocyte count, but with its usual bronchitis there is a leukocytosis of 18,000 to 30,000, the differential count showing 60 to 70 per cent. of polymorphonuclears. In whooping-cough there is a leukocytosis of about the same degree but a very high lymphocyte percentage is regularly present. Another point of resemblance to whooping cough is the contagious character of influenza. On account of the unusual prevalence of influenza, during the months of March and April of this year, sputum cultures were made of all the hospital inmates of the Babies' Hospital. Of ninety persons examined, thirty-one showed the presence of influenza at this examination and three had shown it previously, making a total of thirty-four infected persons or 38 per cent. In two wards containing twenty-one patients with pneumonia or bronchitis ten had influenza. Since the number of children admitted with influenza is so large the presumption is that the nurses contract it from the children and then spread the infection to others. That the temperature curve and the course of pneumonia is influenced by the influenza complication, no one looking over the temperature charts of pneumonia cases complicated by influenza can for a moment doubt. There are many points still to be settled regarding influenza infection. To call every case having an unusual temperature influenza is certainly a serious error, but this infection causes very remarkable fluctuations. Uncomplicated influenza has a good prognosis. When it complicates pneumonia the chances of recurrence are increased. The influenza bacilli have been found to persist for months in the sputum. Of treatment there is little to be said. Thus far it has seemed to me quite unsatisfactory. The contagious character of the disease increases the necessity for isolation. Cases of respiratory infection complicated by influenza seldom benefit by cold air, though fresh air is certainly needed. If symptoms persist it is desirable to send children south to a warm climate.

DR. LINNAEUS E. LA FETRA, New York.—In the study of catarrhal affections of infants and young children there is great difficulty in determining the precise cause of infection, because several germs are usually present, and one must judge which is predominating. Moreover few clinicians have the facilities for proper bacteriological studies. Careful technic is particularly important with reference to the influenza bacillus, for it does not grow readily and seems easily to lose its vitality, especially if dried. Dr. Holt is particularly fortunate in having been able to study both clinically and bacteriologically such a large series of cases. For a number of years it has seemed probable that a certain type of fever accompanying catarrhal infection in infants and children is due in many cases to the influenza

bacillus. It is characterized by wide vacillations in temperature each day, perhaps from 106° to 94° F. In many such instances the influenza bacillus has been found either alone or associated with others; it is fair to conclude that many other cases of analogous type in which the bacteriological study was not made, were probably due to the same cause. The general symptoms are fever and prostration, the fever being of the peculiar hectic type suggestive of deep suppuration. The prostration is quite marked but the child's color does not suggest either suppuration or sepsis, and in the intervals when the temperature is low the child seems surprisingly well. The blood count with many infants and this peculiar temperature and prostration are the only signs found throughout the course of the disease, there being no catarrhal symptoms whatever and no inflammation of the throat or of the ears. It would seem that the child was suffering from general infection without localization. Such cases were very puzzling and generally attributed to deep-seated pneumonia.

Whooping bronchitis is very interesting and it is certainly due in many cases to influenza. Other types of the disease depend on the addition of various local symptoms, such as gastrointestinal catarrh, otitis media in combination with catarrh in the upper respiratory passages. It is exceedingly important to remember the influenzal type of fever since the wide range of temperature might suggest either serious mastoid involvement or the presence of sinus thrombosis. In this connection it is important to call attention to the fact that single blood counts, taken in connection with the high and fluctuating temperature, should not be relied upon for guidance as to the advisability of operation on the mastoid when there is influenzal otitis media. The leukocyte count may be high, up to 15,000, and the polymononuclears may constitute 70 or 80 per cent. without there being any involvement of the mastoid or of the sinus. Only if and when the local sinus in the ear canal and bone tenderness are present should the mastoid be operated upon. General symptoms of fever, prostration and high blood count are not a justification for operation. Besides the catarrhal symptoms of the respiratory or gastrointestinal tract, a frequent manifestation is involvement of the lymph nodes of the neck. So long as the glands remain soft, there is danger of another outbreak of fever or other complication, either in the lungs, ears or even in the meninges. One should be cautious about predicting a termination of the fever so long as the enlarged glands are present. I have seen three cases of influenza complicated by meningitis during the past five years. In the first the primary manifestation was swelling in the small joints of the hands. This occurred in an infant eleven months old. Other joints became involved and there was great prostration with a vacillating temperature. There was very little evidence of meningitis so that a lumbar puncture was not made. At autopsy the brain showed a purulent exudate which gave a few cultures of the influenza bacillus. The second case began with a severe rhinitis and then the typical symptoms of cerebrospinal meningitis of the epidemic type. Lumbar puncture showed a purulent fluid and gave a pure culture of the

influenza bacilli. Influenza bacilli were recovered from the secretions of the nasopharynx. The third case was in a nursing infant five months old. The first manifestation was a convulsion and the symptoms were those of mild epidemic cerebrospinal meningitis. Meningococcic serum was injected but there was no improvement and the growth did not prove to be the meningococcus but the influenza bacillus.

DR. WILLIAM H. PARK, New York.—In the mucous of the respiratory tract in cases of bronchitis or pneumonia in uncomplicated cases or in those complicating whooping cough and measles, the influenza bacilli are so abundant that the Bordet-Gengou bacilli are often not found. It is difficult in many cases to separate clinically cases due to influenza alone or pneumococci alone or mixed cases.

DR. HERMAN SCHWARZ, New York.—Dr. Park had shown that in measles and scarlet fever the presence of influenza bacilli in the secretions of the throat was more frequent in the winter than in the summer. It is interesting to note that the culture for the middle ear in cases of influenza did not contain the influenza bacilli. The cases complicated by enlarged glands did not show the presence of influenza bacilli in the suppurative processes of these structures.

DR. HENRY L. K. SHAW, Albany.—Smears of the nasal and tracheal secretions in forty infants at St. Margaret's Hospital with catarrhal colds showed the pneumococci. The reason the influenza bacilli were not detected was due to the fact that smears were made and not cultures as Dr. Holt had stated in his paper. Recently I saw an infant with meningitis in whose lumbar fluid was found a pure culture of the influenza bacillus. An interesting feature of the case was that there were no previous symptoms of influenza in the baby or in any member of the family.

DR. DE WITT H. SHERMAN, Buffalo.—I wish to ask Dr. Holt in reference to the prostration whether it is considered necessary as a sequel in influenza. In Buffalo this winter there had been a great deal of an infection associated with marked vacillation of temperature. When the temperature was high, either morning or afternoon, the child felt ill, but when the temperature was low it felt almost perfectly well and wished to be up and about. These cases seemed to be influenza but, contrary to expectation, made a prompt and complete recovery.

DR. L. EMMETT HOLT, New York.—In reply to Dr. Sherman's question, I would say that the majority of the patients showed little prostration, only the high vacillating temperature; otherwise they were not ill. Some showed no local lesion. In regard to the finding of the organism in the culture, it was not important unless found in abundance. Thus far no influenza organisms have been found in the glands, or in retropharyngeal or glandular abscesses. These had been mostly due to staphylococci.

ACTIVE IMMUNIZATION IN DIPHTHERIA.

DR. WILLIAM H. PARK, New York.—(Report of the New England Pediatric Society of November 8, 1913, AMERICAN JOURNAL OF

OBSTETRICS AND DISEASES OF WOMEN AND CHILDREN, December, 1913, p. 1213.)

TENTATIVE CONCLUSIONS ON THE TREATMENT OF DIPHThERIA CARRIERS.

DR. FREDRICK M. MEADER, Syracuse.—1. Immunization with diphtheria bacilli will stimulate the body to production of amboceptor-like bodies.

2. These amboceptor-like bodies do not appear to destroy diphtheria bacilli if there is a pathological process.

3. The recovery of carriers under normal conditions is not accompanied by an increase in the amboceptor-like bodies.

4. Carriers that are such by reason of diseased tonsils, hold the diphtheria bacilli in squamous epithelium, which epithelium is necrotic.

5. Probably persons become carriers because of abnormal mucous membranes. The abnormality may be due to mechanical irritation as by a foreign body, or diseased processes due to microorganisms, or to faulty structure of the part as bottle-shaped crypts.

6. The best means of treating carriers would seem to be to stimulate the production of a healthy mucous membrane. This might be done. Careful examination of the throat to detect abnormalities should be made. If necessary the offending part should be removed so that new mucous membranes may be formed. Attention should be paid to the general health of the patient.

THE IMPORTANCE OF MEDICAL SUPERVISION OF OLDER CHILDREN.

DR. EDWARD J. WYNKOOP, Syracuse.—People are waking up to the need of carefully supervising the period of infancy, but they do not realize how important it is to have young children kept under proper medical supervision. At school age medical supervision of the school boy and girl has arrived in this state, and too much stress cannot be laid on this very important matter, for nothing has such a bearing on the future welfare of the children as their proper supervision and inspection and the early and prompt correction of those processes which tend toward mental dullness and physical enfeeblement. Every effort is made to conserve our natural resources and in so doing we must band together to see that the health of the children, from birth on, is guarded so that they may reach maturity fit mentally, morally and physically. I desire to call your attention to that period of the child's life between the ages of ten and fourteen years, or in other words those years leading up to puberty. This period may be the beginning of various nervous phenomena which in themselves are of little importance but unnoticed and untreated may lead to serious results. The rapidly growing child is a complex organism of no mean proportions and demands of its parents or guardian resourcefulness, frankness, sympathy and honesty in all its dealings. The boy or girl at this age is impressionable, easily influenced, oftentimes physically overgrown and awkward, mentally abnormally sensitive and reticent, and frequently diffi-

cult to manage. This is the time to prevent the serious diseases that may last throughout life. Rheumatism, with its many manifestations, chorea, and many other diseases are apt to occur at this period and point the necessity for proper custodianship. Late hours are the cause of an enormous amount of damage. It is almost incomprehensible that the matter of sleep is so neglected. The nervous boy or child, constantly on the go and craving more and more excitement, soon has a nervous system that falls an easy prey to almost any vicious habit. It is the fault of the parents that these late hours are so common among children. We are negligent in our duty not to explain the importance of plenty of sleep to both parents and children. At this age the growing boy or girl needs every bit of nourishment possible to furnish fuel for the rapidly growing structures. Too little time is spent in explaining the necessity of good nourishment and what is meant by proper food and the correct preparation of the same. Many children get enough to eat but it is the wrong kind of food. Probably no condition is more common among girls than constipation and there is nothing which taxes the ability of the physician more than curing constipation in growing boys and girls, with their utter disregard of regularity of habits. The good that could be done in preventing constipation by careful supervision, proper diet, exercise and habits would eliminate one of the greatest evils with which medicine has to contend. Whether sex hygiene can be taught in the average class room is an open question, but the personal contact required by frequent physical examinations will help to eliminate many of the underlying causes of these social diseases and will, I believe, be a great aid toward reaching some accurate conclusion as to the best means to eliminate these diseases. It is the exception for children at the age under consideration to be brought for a physical examination and a good wholesome talk on health matters. The child is advised to seek the dentist at frequent intervals, at least once in six months, and why not the physician to see that the heart and lungs are healthy, the blood and urine normal, and that there is no tendency to deformity or disease. Would anyone gainsay the value that this might have on our anemic and constipated girls, our rapidly growing and nervous boys?

With the advent of school medical inspection and examination of school children, it is going to be possible for us to get in closer contact and keep under medical supervision a certain proportion of these children. It is going to enable us to keep a closer observation of the growing boys and girls, and to bring home to the parents as never before a realization of the importance of making it a business to keep their children well. By starting a closer relationship between the physician and these children it will give the physician many opportunities to advise the parents in regard to the needs of their children.

DISCUSSION.

DR. J. ROBERTS JOHNSON, Syracuse.—This section will be fortunate indeed if we have presented to us any paper for discussion

which in its possibilities for good surpasses this paper of Dr. Wynkoop's. Prevention, not when ignorance, neglect and disease have made the task largely impossible, but in the plastic growing period of youth when it is easy, comparatively, to correct and mould into health, this should be our effort. The conservation of child life is one of the encouraging signs of the times. The medical supervision of older children is a matter of education. The parent naturally resents the idea of the child being subjected to a physical examination unless acutely ill; yet we know that many of the serious ailments of childhood are not recognized by the parent, no matter how intelligent or watchful: for instance, the significance of muscle pains with the ensuing endocarditis. So, too, it would seem unnecessary to most parents that the rollicking boy or girl should be told what, and when, and how to eat, or the need of sleep and of freedom from nervous excesses. The boy or girl approaching puberty is a marvelous mixture of wisdom, energy, and chance, and if ever the combined knowledge and tact of parents and physician is needed it is at this time. Proper oversight cannot be effectively done in mass. Individual instruction and examination by the physician in the home or in the office alone is lasting, as you thereby gain the child's confidence. The medical school inspector should be a specialist in his line, devoting to it his entire time and should be paid accordingly. This plan is meeting with success in certain localities. Liberal appropriations are being made toward maintaining properly equipped school gymnasiums with competent instructors, better buildings with every hygienic convenience and more spacious playgrounds. These are steps pointing to a healthier generation. Nevertheless there should be a closer relation between the parent, the rapidly growing child and the physician. The injurious effect of a hurried breakfast, neglect of going to stool, popcorn, candy, ice-cream, or a dime lunch of almost anything at the school counter or some near-by store surely needs correction. Sex hygiene cannot be effectively taught in mixed classes in the school-room. The sexes should be separated and the smaller the classes the better. The physician has a great responsibility in this matter by imparting wholesome instruction, correcting wrong impressions and habits, and giving assurance. The overcrowding of school work in the higher grades with its resulting nervous strain is a serious outlook for the future. The backward child, the mentally deficient child, the child handicapped by poor food and environment, these and many other conditions are taxing the child's nerve centers until some functional or organic disease brings the case to the physician's attention. What of the pernicious habits among school boys of cigarette smoking, of constipation and anemia among the girls, of goiter, nasal deformities, chorea, dull hearing, unrecognized valvular disease? These and many more conditions, called healthy, should cause us seriously to advocate the regular physical examination of every child up to the age of fifteen years. This closer touch would mean better morals, a deeper regard for the known laws of hygiene and health, and in the end a higher civilization.

THE CAUSES AND TREATMENT OF ECZEMA IN INFANCY AND CHILDHOOD.

DR. ROWLAND G. FREEMAN, New York.—Eczema being a disease of the skin, might seem in a city like this to be a disease which should always be treated by the dermatologist. This disease occurring in infancy needs, I believe, a pediatrician more than a dermatologist, for while the applications to the skin are important, in most cases the regulation of the diet and the daily régime are far more important than the local applications. Eczema is one of the common diseases which the pediatrician is often called on to treat and it is often considered one of the most resistant to treatment. There is also a popular idea, in which some of the members of the medical profession sympathize, that the cure of eczema may be followed by sudden deaths, and this may well be the case if an attempt is made to cure eczema of internal origin by external application only. These eczemas of infancy follow many types and may be acute or chronic. Acute eczemas not infrequently develop during the first weeks of life in children fed at breasts which produce much more milk than is required for the nourishment of the child. They often give a fairly typical history. The infant may be gaining from 70 ounces to a pound a week and having from five to six movements a day which, while yellow, contain curds and mucus. Suddenly the skin of the face and body becomes red and soon assumes the typical dry scaly appearance of eczema. On weighing the baby before and after feeding it is found that the child is getting much more food than it is entitled to, while an examination of the breast's milk shows a normal or rich quality. These babies are readily cured by reducing the time of nursing so as to limit the baby to the proper number of ounces of milk for its age. Many of the eczemas in older children are more difficult to treat, especially if it is found that the child has been on a normal amount of well-balanced ration. In such cases considerable information may be obtained by a careful analysis of the urine directed particularly to the detection of marked acidity, to the presence of acetone and diacetic acid, or evidence of intestinal intoxication as shown by the presence in the urine of indican and phenol. If the tongue is coated efforts to improve the digestion so as to give it a normal appearance should be undertaken, while if the movements show irregularities or any elements of the food are present in the stools in abnormally large amount an excellent clue would be furnished for dietary modification. Local sources of external irritation must of course be removed, especially pediculi capitis, plugs of wax or inflammation of the ears, adenoid obstruction, or the irritation from an adherent foreskin shutting in decomposed smegma.

While the removal of these external sources of irritation may hasten the cure, the internal derangement, usually of the gastrointestinal canal is of far more importance. The stools sometimes show some part of the food undigested while constipation or diarrhea should be corrected. The putrid stool indicating proteid decomposition, the sour stool indicating carbohydrate disorder, or the

ammoniacal urine indicating too much fat in the food should be noted and efforts directed to their correction instituted. The types of these eczemas vary. Usually there is a seborrheic eczema of the scalp, often an eczema of the cheeks, or in the fold behind the ears. The neck may be involved or the parts under the diaper. In other cases isolated areas exist for years.

The treatment of these cases must begin with the removal of the external source of irritation. Errors in diet must be corrected. If excessive acidity of the urine or acidosis is present, it may call for the use of saline laxatives and alkalies; or an intestinal intoxication, as shown by the presence of indican and phenol, may indicate a putrefactive process in the intestine which may be relieved by the administration of lactobacillary culture. Excess of fat or carbohydrate in the stools should direct attention to the reduction of these elements in the food. In many cases the trouble is too much food; in others a badly balanced ration; in others some irritating food such as eggs, oatmeal, or stewed fruit, or cake, candy, or preserved fruit, or jam and marmalade. In these cases we have one of the most important uses of caloric feeding. There are exceptional cases where a poorer but more easily digested food may be given, the calories being made up largely of sugars, as in malt soup.

The external treatment we must learn from the dermatologist and most of my resources have been gotten from Dr. George W. Crary. In order to get the most prompt result the application must be kept in constant contact with the diseased skin. For facial eczema a mask should be worn, while on the limbs the application should be covered by lint and bound in place. Lassar's paste, made from one part zinc oxide, one part starch and two parts vaseline is altogether the most useful application for the skin, especially the face. It may be rendered somewhat antiseptic by the addition of 2 per cent. resorcin or euresol. For the dry chronic eczematous patches on the body or limbs of babies I find one part tar ointment to seven parts Lassar paste most useful. For the scalp in some cases a diluted sulphur ointment is useful. A number of illustrative cases were cited.

DISCUSSION.

DR. FRANK VANDER BOGERT, Schenectady.—I wish to report a case of eczema, in a breast-fed baby in which examination of the mother's milk showed a fat percentage of 10 per cent. in the one breast, while in the other breast the percentage of fat was subnormal. This case was apparently cured in one week by prohibiting the use of the high fat breast and regulating the mother's diet and exercise. In two other cases the elimination of curds in the stools was effected by the use of sodium citrate with the food and this was effective in clearing up the eczema.

DR. GEORGE W. CRARY, New York.—In the consideration of eczema in children there is sometimes too much emphasis put on the internal element in the disease and too little on the external. In

fact, both internal and external treatment are needed. To say that any one article of food is bad and should be forbidden is not the correct position to take; anything that disagrees with the individual child lessens the resistance and lays the skin open to attack as well as other organs. That some catarrhal conditions of the mucous membrane are due to overfeeding has been brought out and this is a very important cause. In such cases the skin condition may be regarded as due to the effort of that organ to assist in the eliminative process and to get rid of the surplus food. Sometimes a seborrhea in an attendant is responsible for the skin condition of the child. This should be borne in mind and the attendants watched and treated if any such condition is found. Some of these cases are found to be intolerant of fat and when this idiosyncrasy is found the line of treatment should be regulated accordingly. Lotions are, as a rule, better than ointments. Lassar's paste has given me good results. One important point in the treatment of eczema is team work, attention to the diet and also to the skin. Sometimes the ability to do both of these is found in one man, but not often, and so there should be cooperation between the pediatrician and the dermatologist.

DR. L. DUNCAN BULKLEY, New York.—I endorse heartily all that Dr. Freeman has said in regard to the internal causes of eczema and the absolute necessity of regulating the diet and attending to the secretions of the bowels and kidneys, in infants as well as in adults. The child may be restrained from scratching himself by the use of a pillow case slipped on up to his neck; then with the hands pinned in the sides, the child is comfortable and has some freedom of motion and yet is unable to do himself any injury. For a general eruption on the body nothing does better than my calamine and zinc lotion with the following formula: Carbolic acid, $\frac{1}{2}$ dram; calomine, prepared, 1 dram; zinc oxide, 2 drams; glycerine, 3 drams; lime water, 4 drams; aqua rosæ, 4 ounces. This sopped on freely many times daily serves the best purpose in generalized eczema of the body and extremities. I prefer lotions to ointments. I have treated more than 1300 babies under five years of age and there was a larger proportion of cases among babies having long foreskins.

DR. DEWITT H. SHERMAN, Buffalo.—Do you find, Dr. Freeman, that acid fermentation is more often the cause of eczema?

DR. ROWLAND G. FREEMAN, New York.—Not in my experience; in many cases there is nothing abnormal in the urine at all.

Second Day, April 29, 1914.

THE EFFECT OF SUGARS ON THE GASTRIC SECRETIONS OF CHILDREN.

DR. DEWITT H. SHERMAN, Buffalo.—When we started the study of gastric analysis in infants a few years ago we did not plan for the rather extended investigations that we have made. Had we appreciated at the start how far our studies would lead us, our plans would have been more comprehensive, and we would have avoided some

little discrepancies which would have made our tests a trifle more harmonious.

Our technic, in all our series of cases has been the same. In this series in the testing of the three sugars, namely, the milk sugar, cane sugar, and malt sugar, we used fifteen babies. Each baby was tested on each of the three sugars. The sugars were all in a 6 per cent. solution, in a similar barley water mixture. As in other series of tests the gastric contents were withdrawn one hour from the middle of the taking of the meal. In this series as in our former ones we give the average.

The amount ingested of all three sugars averaged exactly the same, *i.e.*, 144 c.c. The amount recovered varied some. Of the milk sugar solution it averaged 23.30 c.c.; of the cane sugar solution, 34.40 c.c.; and of the malt solution, using Mead's dextri-maltose, 33.40 c.c. The last two were virtually the same, but of each about 50 per cent. more was recovered than of the milk sugar solution.

Whether we can infer from this that the milk sugar solution passes on more quickly than the other two solutions, we are not prepared to say. We doubt it though, for did the milk sugar solution stimulate to greater activity the motor function of the stomach, we would naturally expect it also to stimulate to greater activity the secretory function. This it does not do.

We are naturally pleased to see how closely our second series of fifteen cases on barley water with milk sugar compares with the first series made three years ago. Our first series reads: Free hydrochloric acid, 2.10; combined hydrochloric acid 5.60; total acidity, 9.00. Our second series reads: Free hydrochloric acid, 2.30; combined hydrochloric acid, 3.90; total acidity, 8.70. The only difference lies in the combined hydrochloric acid. As there is a difference in this one respect we have combined the two and we deduce from a series of thirty infants our standard: Free hydrochloric acid, 2.20; combined hydrochloric acid, 4.75; total acidity, 8.85.

We find that the cane or granulated sugar solution stimulates gastric secretions a little more than the milk sugar solution, and that the malt sugar solution, in the form of dextri-maltose, is more than twice as stimulating as the milk sugar solution. This last fact may be of some importance to remember in infants with hypersensitive stomachs.

Our average for the three sugars is as follows:

	Free HCl	Combined HCl	Acid. salts	Total acid
6 per cent. milk sugar solution in barley water.	2.30	3.90	2.20	8.70
6 per cent. cane sugar solution in barley water.	3.80	3.80	3.00	10.50
6 per cent. dextri-maltose solution in barley water	6.60	0.60	3.00	19.20

The infants tested averaged about seven months. The youngest was three weeks and the oldest was eighteen months. The very youngest ones ran an average a trifle higher than our standard. The oldest ran a trifle below our standard average.

DISCUSSION.

DR. T. WOOD CLARKE, Utica.—This paper is a valuable contribution to our knowledge of infant feeding. The infants who vomit hard curds are usually cases of gastric hyperacidity. It has been found that the addition of lime water to the milk increases the gastric acidity and the firmness of the curds. Sodium citrate, however, added to the milk reduces the hydrochloric acid content and prevents curd formation. Practically this gives very good results and cases of curd vomiting and curds in the stools are quickly controlled by citrating the milk. Recently I have been worried because I have not obtained the expected results from citrating milk. In a number of cases I have found that citration has not removed the curds from the stools and I have not understood why. Dr. Sherman has explained this matter. I have been using malt sugar more than formerly. Apparently the malt sugar by stimulating to excessive hydrochloric acid secretion makes it necessary to increase the amount of citrate to be added to the milk.

DR. SHERMAN, Buffalo.—The discussion of this subject has demonstrated that rapidity of the passage of the sugars and the size of the curds is in direct proportion to the acidity. We have also gotten the information that lime water is a gastric stimulant. I do not usually use alkalies, but if I do use them it is in the form of a citrate in the food or a small amount of alkali between meals.

ANTITYPHOID VACCINATION IN CHILDHOOD.

MAJOR F. F. RUSSELL, U. S. A. Medical Corps, Washington.—Antityphoid vaccination was introduced into the Army in 1909, and in that year we vaccinated a few children and have been vaccinating more and more each year since. The results have been very satisfactory. Typhoid fever is a disease of young persons. Of 1000 deaths from typhoid fever collected from the registration area of the United States, one-third occurred in persons under twenty years of age and one-fifth in those under fifteen years. Another reason why the results of antityphoid vaccination were so satisfactory was that children stood vaccination well and the reactions were few. We have collected statistics on the temperature reactions, both general and local, in children all over the United States. We have classified the reactions into two classes: those that were troublesome and those that were not. The troublesome ones include the moderate and the severe reactions. Less than 2 per cent. of the children showed a temperature reaction of 103° F. or more. As a rule, the children did not have to remain home from school or indoors. Sometimes there was a slight fever in the children who were vaccinated but they were unaware of it. For these reasons vaccination among young people is increasing rapidly.

We never take the risk of vaccinating a sick child, that is, one seriously ill; a trivial illness is not a contraindication. But here one must use his discretion and be governed by the degree of illness and by the immediate danger of typhoid.

Among the children vaccinated no harmful effects have been reported and there has been no case of typhoid fever that could be learned of. It was not possible to follow up the children as closely as the men in the army, but I think that if there had been a case of typhoid fever in a child who had been vaccinated we would have heard of it. Furthermore, it was true that many of them had been exposed to the disease.

Revaccination should be performed more frequently in children than in adults.

The dose is regulated according to the weight of the child, the rule being, for instance, that if the weight of the child is one-third that of an adult, the dose of vaccine should be one-third of that given to an adult. It is better to give a little more rather than a little less in proportion to the weight. If the child has gained rapidly in weight it may be advisable to repeat the vaccination. The duration of immunity is thought to be about three years; as yet there has been no falling off in the immunity of the men in the army. In the antityphoid vaccination it is a good plan to follow the method used in small-pox, that is, vaccinate once in infancy, once in childhood, once in youth, and once in adult life. This would probably give good protection. The results of antityphoid vaccination in the army are most convincing as to the value of this measure. In the year 1913, in the entire army of 90,000 men there were only three cases of typhoid fever and no fatalities. One of these occurred in China and that man was not vaccinated and the other two cases occurred in new recruits who came down with the disease before the vaccination was completed.

There is one other way of measuring the efficiency of any procedure and that is by the "constantly noneffective rate." According to this, before the introduction of antityphoid vaccination one man out of every thousand was sick every day in the year; last year only one three-thousandth of a man was sick every day in the year. This measure of efficiency showed that antityphoid vaccination saved the time of the soldier and kept him out of the hospital and fit for duty. A sick man meant not only that one man's time was lost but that it took the time of two others to care for him. The same is true of any school, or institution, and in the face of our present knowledge no schools or institutions should run the risk of an epidemic of typhoid fever when it could be prevented without risk.

The injection should be given subcutaneously and never deep into the muscles, choosing Saturday afternoon so that should any reaction occur, the subject of the vaccination can lay off over Sunday. It is desirable to have a slow absorption which one gets in the loose subcutaneous tissue. With a deep injection one is apt to have a severe reaction which will arouse an opposition to this measure which is unnecessary. The second dose should not be given at the site of the first, but a new site should be chosen. The severe reaction following a deep injection shows that the absorption is too rapid. The second injection is given in the army,

after an interval of ten days; in civil life after an interval of a week.

A fear has been expressed that antityphoid vaccination may develop a latent tuberculosis. Our statistics show that not only has the steady decrease in the number of cases of tuberculosis in the army been maintained but that the decrease in the number of cases has been more rapid since the introduction of compulsory vaccination. This is no doubt due to the improved sanitary conditions and the greater care exercised in examining recruits. In the annals of medicine there is only one campaign that can be compared to this one and that is the practical extermination of small-pox by vaccination.

DISCUSSION OF MAJOR RUSSELL'S PAPER.

DR. MORRIS L. OGAN, New York.—The Health Department has used the typhoid vaccine immunity culture since the beginning of 1913, and during that time has injected some 2000 persons with complete immunity. It is well known that typhoid fever is a disease of youth and childhood. We have had some experience with children under twelve years of age. In a series of cases numbering 1491, to which Osler refers, one-half occurred between the ages of twenty and thirty years. In our experience we have found typhoid fever occurring oftener between fifteen and twenty years and we also had a larger proportion of cases under fifteen years than did Osler. The statistics of the Health Department show that the disease is at least as liable to attack children as adults. In a series of 1700 nonimmunized children 2.8 per cent. contracted the disease, while in a series of 5000 adults 2.1 per cent. contracted the disease, thus it would seem that it was easier for children to contract typhoid fever than for adults. One-quarter of the population of Greater New York is children under twelve years of age and they furnish one-quarter of the cases of typhoid fever. Physicians have been advising against vaccination and giving as their reason that children do not often contract the disease. This idea should be combated. This impression has probably gained a foothold because typhoid fever in children has frequently not been diagnosed properly.

Of 318 exposed children who were vaccinated but four contracted typhoid fever and these were mild cases without any deaths. One case ran a course of seventeen days and another of eleven days after one injection. So it would seem that in the actual presence of the disease vaccination was not only justifiable but advisable.

As to the severity of the reactions; we have not been able to follow the subjects as closely as one could in private practice, often not seeing the case the day after vaccination, but only on the revisit for further immunization. About 73 per cent. of all the reactions were very mild, only a slightly sore arm and a general malaise. We have found that the reactions are apt to be more severe during the first six years than during the last six years of childhood. We may have been giving a slight overdose. We have been giving the

children more than the average dose according to their weight. We have had really severe reactions in only five cases and one of these was actually coming down with the disease. Another severe reaction had occurred in a child one year old. In only one instance did the temperature reach 103° F.

In conclusion it may be said that our experience is extremely favorable and we find with others that children bear antityphoid vaccination better than adults.

DR. GODFREY R. PISEK, New York.—This paper is very important just at this time when so many parents are asking as to the advisability of antityphoid vaccination for their children. Each member of this section should stand as a committee of one in urging this measure. My personal experience so far has been with children of seven years or over. All children attending boarding school, traveling or exposed to infection should be vaccinated. I would like to emphasize the importance of the subcutaneous injection and the avoidance of deep injections.

The opposition to typhoid vaccination on the part of many practitioners is very discouraging and must be due to the fact that they have never heard Major Russell.

DR. WALTER LESTER CARR, New York.—In my experience with older children, principally boys at boarding school, the dosage is relatively greater than that mentioned; in strong boys I often give full dosage with very little reaction. I advise general antityphoid vaccination in children at school, traveling or in any manner exposed to typhoid infection. Physicians are more frequently diagnosing cases of typhoid fever in childhood and this may account for the relatively greater proportion of cases of typhoid in children reported by the Board of Health of New York City.

MAJOR RUSSELL, Washington, in closing.—I am glad that Dr. Ogan spoke of immunity in contacts. We vaccinate against all contacts and have seen no bad effects. One occasionally has trouble with those having severe reactions and one way to get around this is to give small doses and give them more frequently. Instead of giving the full dose and repeating at the end of ten days, give one-half the dose and repeat in five or six days. This keeps the patient just under the clinical reaction.

DR. LILLIAN H. SOUTH, Bowling Green, Ky.—In my work as State Bacteriologist of Kentucky, I have distributed 15,000 doses of antityphoid vaccine. Owing to the flood we have had several severe epidemics. In one town of 1000 inhabitants we had 500 cases of typhoid fever. Our inspectors are all immunized. We have built the "Kentucky sanitary toilet" and stamped out the disease. The prevalence of typhoid fever has been due to bad sanitary conditions in the rural districts and the great factor in eliminating the disease has been the sanitary toilet which is a miniature septic tank. The only attention it needs is a bucket of water once a week.

In giving the immunizing dose of vaccine we inject it into the abdomen subcutaneously. If there is a reaction we postpone the administration of the second dose for fifteen days. Then again we

give one-half the dose the first time and repeat at the end of five days. Another method is to give a small preliminary dose to see how the organism will react. The vaccine has been used in the treatment of fifteen cases and reported as very successful.

When the physicians know that the vaccine comes from the Government they are willing to tell the people about it and the people are willing and glad to have it used. In Kentucky we do not have to contend with antivaccinationists and antivivisectionists as you do. The people are willing to do anything to prevent or cure typhoid fever. We realize, however, that vaccination must be accompanied by instruction in other sanitary precautions.

If any one would like to know about the sanitary toilet the State Board of Health of Kentucky will be glad to send a bulletin. We wish to distribute information about them as they are not only instrumental in conquering typhoid fever but dysentery and hook-worm as well.

INFANT WELFARE WORK IN NEW YORK STATE.

DR. HENRY L. K. SHAW, Albany.—I wish to show what the problem of infant welfare work is in the State outside the City of New York. In the State outside of New York City there are only thirty-two milk stations in twelve localities; in only three places are the stations open all year, and only two are controlled by municipalities. In New York City last year the death rate, per 1000 births, among infants under one year of age was 101, while in the rest of the State it was 120. This cannot in any possible way be assumed to be accidental but is due to various causes. The statistics of New York City show that the drop in the infant death rate was coincident with the establishment of the milk stations. A comparative study of the mortality rates in the cities of different classes throughout the State shows that outside of New York City the mortality rate is least in the cities of the first class where more welfare work is being done. The cities of from 10,000 to 20,000 population show the highest death rates. Then as the size of the towns decreases the death rate among infants decreases until we find that in rural districts it is 103 per 1000 births in 1912, and 111 last year. The mortality for the first month of life was from 30 to 40 per cent. of the mortality of the other months of the first year. Outside of New York City we have not reached the supervision of the first month of life or the prenatal work such as has been done by the New York Milk Committee. They show that their work has reduced the rate for the first month 18 per cent., and that of the supervised cases 95 per cent. were breast fed.

The cities of the second class are badly in need of a housing law which would obviate the present deplorable sanitary conditions. This is one of the greatest factors in the present high infant mortality. The lantern slides will show some of the out-door toilets which are used by fifteen or twenty families and as a rule do not flush properly. Again the lantern slides show the filthy condition of the back yards.

Of the thirty-two stations in the State, eight are in Buffalo, ten in Rochester, and two in Syracuse. These thirty-two stations have had enrolled 7285 babies and show a mortality of 100, or 1.5 per cent. There could be no better argument for the milk station.

In Utica they have used a school room for a milk station during the summer. I speak of this to point out how the unused school may supply the needed milk station during the summer. Buffalo, Utica, and Poughkeepsie have milk stations open all the year around.

As the State Department of Health is initiating a campaign to reduce this unnecessary infant mortality, I wish to tell you that a station may be equipped for less than \$100. We have such a model milk station in our child welfare exhibit.

It seems wise that the State Board of Health should keep a supervision over these milk stations, so blanks are furnished very much like those used by the Child Welfare Association in New York and reports are sent in once a week.

A large number of letters were sent out to health officers in all parts of the State and 700 replies were received, showing that in ninety places something was being done along this line, but mostly by philanthropic or civic societies. As to the visiting nurses, there were fifty-four in thirty-two places, and thirty-three in eleven places in charge of thirty-one stations. There were only nine employed during the entire year. There were twenty-one visiting nurses in twenty localities. There are twenty-four day nurseries in twenty different places and it would be advisable to abolish these and turn them into infant welfare stations.

DISCUSSION.

DR. T. WOOD CLARKE, Utica.—The state of New York is to be congratulated on the formation of the Division of Child Hygiene of the State Department of Health under Dr. Shaw. The smaller cities of the State need an awakening on infant hygiene and it looks as though they were going to get it.

Utica started its infant welfare work two years ago under a private committee. Where possible, the work should be done by the city, but in some places this is impossible if the work is to be effective. Two years ago Utica had one station for two months in the summer. Last year it had two stations during the summer and one all winter, the latter having been supported by the surplus left from last summer's contributions. Prenatal work is being done in a small way and Little Mother's Leagues are to be formed. The results of the work appear in the mortality rates. In 1911 the mortality rate was 158 per 1000 births; in 1912, 143, and in 1913, 138. The summer mortality is especially striking. The highest summer mortality for one week was, in 1911, 273; in 1912, 266; in 1913, 201. The expense of a private welfare station is less than \$100 a month. The way to start an infant welfare station is simply to get the people together, get somebody to give them a talk, and tell them to go after the money. The appeal for money for the

babies brings quick response. It is very significant that during the first summer as soon as the station was closed, the first of September, the death rate rose.

DR. JOSEPH C. PALMER, Syracuse.—Dr. Shaw in his excellent paper has referred in most complimentary terms to the infant welfare work in Syracuse. Considering our death rate of 145 you may well ask, "What has it availed?", and wonder if the farther up the State you go the higher the death rate becomes. This is of course not so, and in spite of the figures we feel that we have made a good beginning, and that with a baby-saving show early in June and twice as many stations and more than double the number of nurses to carry on the work this summer a marked improvement should follow. New York and one or two of the other cities with which Syracuse has been compared unfavorably has had the benefit of concerted effort in baby saving for a number of years, while our campaign is still in its infancy. We have a sense of pride in the fact that of 473 babies registered at our stations there were but three deaths. It seems to me that whatever the plan adopted the essential feature of the work should be educational. The mothers come to the welfare station primarily for milk, but they must not be allowed to return home without their lesson covering the rules and suggestions we have heard so often. There must be instruction and education before the baby is born. That this is true has been ably proved by Dr. Philip Van Ingen in his recent paper.

The stations, or at least a part of them, must remain open during the entire year. We must preach over and over again the sermon of fresh air, proper sleep, cleanliness, bathing, proper food, care of the milk and utensils, the proper amount of water, the exclusion of flies, etc. We know what to do, the copy work has been set us by New York, New Zealand, Philadelphia, Chicago. Now we must learn how to do this and we will learn by doing it.

DR. CHARLES HERRMAN, New York.—In the organization of infant welfare stations in the small town the method of procedure will naturally be different from that in large cities like New York, where large sums of money are available. At the beginning experienced pediatricians may be willing to conduct the work without salary, but later they will have to be recompensed for their time and trouble, as they should be. The distribution of milk in small bottles, each sufficient for one feeding, or even in a single quart bottle adds to the expense of the station and is not absolutely necessary. The mother can obtain it from any reliable dealer. The control of the regular attendance at the station depends on the physician and especially on the visiting nurse.

THE HEALTH PROGRAM OF THE PHYSICAL TRAINING DEPARTMENT,
BOARD OF EDUCATION, NEW YORK CITY.

DR. C. WARD CRAMPTON, New York.—It is impossible to describe even briefly all that has to do with the health care of the 700,000 children in the schools of New York. It involves the care

of the child in respect to such subjects as ventilation, heat, light, eyestrain, and a long series of subjects upon which there is not time to enter.

The method of teaching hygiene up to two or three years ago was a farce, based on the assumption that by teaching the child anatomy and physiology you would then have a basis upon which to teach him how to care for his health. Now we start out in a much more direct way. We start with the demand, "Bring you tooth brush to school tomorrow." The child brings the brush, is taught how to use it, and that hereafter he will be expected to keep his teeth clean and will be given three months in which to have his teeth filled if they need this attention. Instead of the study of the skin and pictures of its complicated structure, we now have inspection and the child is taught the practical lesson of cleanliness. In the high schools we expect more. The old idea that for five hours a day the child should sit quietly, that he is a receptacle to be filled with extract of text-book is all wrong. Such immobility is unnatural and should have been varied by physical training exercises. We proceed on the thesis that we should provide exercises which children would ordinarily do under normal conditions, and we have put this idea into the schools. Normal physical play is necessary to mental, moral, physical, and social development.

We have developed class gymnastics on the functional basis. We want from the exercise a stimulation which will give an increased heart beat and a change in the stasis of the blood. We aim at education in precision, and definite coordination of movements, and this kind of exercises are related to mental development. The child who is physically immobile is a motor dullard, and motor dullards are apt to be mental dullards. The mental training aims to give accuracy, alertness, precision and inhibition and is educational. On the other hand, the hygienic exercises are different and are given separately. The good posture exercises illustrate this and are given separately. Bad posture is a ptosis, what we know as a visceral ptosis, the debutante slouch, being an instance and the hygienic exercises are directed against this. The rounded abdomen is characteristic of the child of school age and is counteracted by our work with the ligaments supporting the abdominal contents. The correct posture is gained by straight knees, slightly braced, head up, chest up, and shoulders in easy position, not braced back to make a flat back. The chest should be raised and the shoulders forgotten. The mental stimulus is important in getting the right posture. Tell the boy to stand like a soldier, the girl "to have a little style about her."

Some of the exercises advocated for boys are mimic discus throwing after the fashion of the ancient Greek, mimic fencing, etc. For the girls folk dancing is most effective in securing the desired results. In these dances the girls are given as much trunk work as possible. Girls do not need exactly the same training as boys since their work is different. Hockey, walking, and basket ball are indulged in and I feel sure that this training promises well for the future of the race.

Under the direction of Dr. Crampton several school boys gave a demonstration of the exercises practised, in the schools in place of the former gymnastic of the German school.

DISCUSSION.

DR. GEORGE DOW SCOTT, New York.—I would like to ask Dr. Crampton if the girls use rope skipping and jumping in the schools. I formerly employed it in the training of football squads and found it most useful as the muscles are made more pliable by it; it was a great help in teaching the ball players to get a quick start.

DR. CRAMPTON.—I do use rope skipping and since you have spoken of it I shall use it more than hitherto, but I am opposed to the development of muscle *per se*; that is out of date. The individual of the present day does not need large muscles; what we are aiming to attain is a well-balanced organic development.

DR. JOSEPH C. PALMER, Syracuse.—One thing that occurs to me as especially important is that there should exist a more intimate association between the Physical Training Department and the Department of Medical Inspection of School Children. They are interdependent and should be in every way cooperative. The defective, choreic, or neurotic child should have his or her physical drill adapted to the more sensitive organism with caution lest there be overfatigue or exhaustion. The rheumatic cases and those with heart murmurs should have only such moderate exercise as is suited to their condition and should be debarred from entering contests which would entail violent physical strain, such as football, track athletics, field contests, and skating races. Cases of scoliosis and kyphosis should be most carefully studied and receive training in classes and groups with care to avoid any violent strain or shock. I was privileged to attend a class of this kind conducted by Werndorff in the Lorenz Clinic where 40 or 50 Austrian girls came twice a week for educative exercises and to receive stretchings and kneadings suited to their condition. Classes of this character are conducted in the out-patient departments of some of the hospitals in this city. The pretubercular child, the frail or poorly nourished child, should have light and carefully regulated exercise. We must create a public interest which will give a swimming pool and gymnasium in every school building. We must have more playgrounds and more athletic fields. We should do all in our power to extend the physical training and medical inspection to the rural districts. Proper breathing we were told yesterday by Dr. Culbert often inhibited and prevented the growth of adenoids and tonsils and we should take advantage of all these means to improve the child's resistance. An investigation by the National Council of Education and the American Medical Association has shown that city children are from 10 to 20 per cent. healthier than country children. A study of twenty-five typical cities and of several hundred rural districts chosen at random in Massachusetts, New Jersey, Virginia, and Idaho proved this to be a fact. It was found

that 23 per cent. of city children suffered from poorly nourished bodies, and 31 per cent. of country children suffered from this condition. Heart trouble was twice as prevalent among country children as among city children and lung trouble three times as frequent. In one city the figures showed that in 69 per cent. of the children there were physical defects important enough to warrant medical attention and in 1800 country districts of the same state the percentage was 75. It is no longer city life against country life, but city oversight and care against rural indifference and neglect. About 90 per cent. of our cities have open-air schools for children, but I know of no open-air school in the country except that of drudgery at daylight, and the pitchfork. There are no classes for the mentally defective in the country and it is from this source that we may look for much of our crime and degeneracy. It is the old story that health is purchasable. Perhaps by recognizing these facts and rehearsing them some little aid may be given in improving conditions among school children in both the city and the country.

DR. C. WARD CRAMPTON.—In reply to the question in regard to competitive athletics I would say that I have no use for athletes, but much use for athletics. The athlete has only one use and that is to get the boys interested and to arouse enthusiasm. He serves as an advertisement. I would like to put athletics in the life of every boy but no overstrain. Our boys have competition against a standard and not against another boy. All the time every boy gets physical work; in class athletics every boy competes. The boys get medals when they attain a certain standard, and there are successive standards for which they may work. We have athletes and we care for them. There have been a few alleged untoward results but on investigation it has been found that there was nothing in the allegations. We take all precautions to guard them from overstrain. We now have just one-fourth the apparatus in the schools that we had six years ago. We still use dumbbells, wands and Indian clubs, but not to the extent that was formerly done. We now have the rubber broad jump mat, and 7800 chinning bars have been placed in the schools.

We have special classes for crippled children with special exercises suited to their individual needs and special games. We give all the girls sane treatment as far as ptosis is concerned, instruction in hygiene and hygienic exercises with emphasis on the abdominal muscles and corrective exercises to counteract the ptosis.

RECORD CHARTS FOR THE NEW-BORN.

DR. WALTER LESTER CARR, New York.—The case reports presented are made to suit my own needs, and if adopted by the gentlemen present will no doubt be modified to meet special requirements. I have arranged all my card histories for a unit size four by six inches, as a history blank of this size is easily carried. If a larger history blank is needed the size may be doubled and a firm linen paper will not break in the fold.

The first record is for use shortly after birth and is also for the obstetrician who has charge so that attention may be directed to the care of the baby. The essentials which I regard of the greatest importance are "Eyes treated with," "Cord dressed with." They cover the most important part of the primary management of the new-born. The other headings are arranged for the average care and may be used every day or at the time of the physician's visit. The second chart is used in fixing the time of nursing and helping the nurse or mother in establishing a routine. This chart is of much value for babies of poor nutrition who require systematic oversight.

DISCUSSION

DR. CHARLES HERRMAN, New York.—I wish to say a word as to the importance of carefully kept charts for the new-born. When one considers the great mortality during the first month and especially during the first two weeks, it is evident that the early care of the baby is most important in reducing the mortality. Most internes are now trained to recognize the value of a chart for without such a guide one is liable to overlook some point.

DR. WALTER LESTER CARR.—In regard to the two points emphasized before, the care of the eyes and of the cord, I wish further to say that infection may occur through the cord and appear in some remote part of the body and the cause may not be recognized. My idea is to call attention to the need of very careful supervision during the first few days of life.

Thursday, April 29, 1914.

SPORADIC CRETINISM. A CLINICAL STUDY OF FORTY-ONE CASES.

DR. CHARLES HERRMAN, New York.—I shall give a summary of the forty-one cases of sporadic cretinism that have come under my attention during the last fifteen years and then discuss briefly the physical and mental development of these patients.

Of the forty-one cases observed thirty were females and eleven males. This marked preponderance of females is also characteristic of adults. It is interesting to note that in one case the patient was the only female of four children, in another instance the only female in five children, and in a third the only female in six children. A large number of the patients of this series were observed at a very early age, sixteen being under two years of age. Of these eight were under one year of age. I believe that in the majority of cases the disease is congenital, because so many cases came under observation with distinct symptoms before the end of the first year, and because so many coming under observation at a later period gave a history of having had significant symptoms such as umbilical hernia and obstinate constipation from birth. I do not believe that the mother's milk contains substances which counterbalance the deficit of thyroid secretion in the infant because a number of these patients showed distinct symptoms while at the breast. All cases of myxedema are not

necessarily due to an absence of thyroid gland. An instructive case was recently reported by Hochsinger in an infant one year of age. Both Hochsinger and Kassowitz made the diagnosis of congenital myxedema due to congenital absence of the thyroid gland as no thyroid tissue could be felt. The patient died and at autopsy the thyroid was found still present but markedly infiltrated by a growth of new connective tissue. The case also illustrated how difficult it is to palpate the thyroid gland. In only two of the forty-one cases was there any history of goiter in the family.

In twenty-five of the cases the parents were Russian Hebrews. Making allowance for the fact that at a number of the clinics at which these cases were observed a large percentage of the patients are Hebrews, still the large proportion is striking.

The series offered an unusual opportunity for studying the effect of long treatment, for thirteen were under observation for more than five years and of these, seven were observed for from ten to eighteen years.

As to consanguinity, in only four cases were the parents related, and it is noteworthy that of these, three were in one family. Taking the entire series, consanguinity does not seem to have played a part in the causation of the disease.

A distinct history of constitutional disease in the family is not common. Tuberculosis, syphilis, and malaria are not more common in the histories of the patients with sporadic cretinism than in those of other patients coming for the treatment of other diseases. Except in two families only one member was affected. The patient was usually not the first or last child, but "sandwiched in" between normal children. A still stronger argument was presented by one of the patients presented who is one of twins, the other child being perfectly normal in every respect. It seemed unlikely that constitutional disease in the parents would manifest itself in only one of the twins.

The Binet-Simon tests are of very great value but have their limitations. They are only applicable to children whose intelligence corresponds at least to that of a normal child of four years. The results obtained by this method compared with the intellectual development as shown by the patient's grading in school correspond pretty accurately.

The data regarding the cases presented in respect to physical development, mental development, retardation of mental and physical development, and the age at which treatment was begun seem to justify the following conclusions:

1. Under thyroid treatment, if begun early, the physical development may reach normal.
2. When treatment is begun late the physical as well as the mental development may remain much below the normal.
3. The improvement in the mental development is never as great as in the physical development.
4. The earlier the treatment is begun the better the result as far as mental development is concerned. In the cases of a brother and sister presented it was noted that in the former the treatment

was begun at fifteen months with a mental retardation of six and one-half years, while in the latter it was begun at the age of one month with a retardation of but two years.

5. In congenital cases, if the treatment is begun after the first year a marked intellectual retardation persists. The later the treatment is begun the more marked will be the retardation.

6. In order to obtain good results the treatment must be regular and continuous. One of the cases presented illustrates this point. When the treatment was regular the increase in height was $3 \frac{1}{2}$ inches a year, whereas, during the periods when it was irregular it was as low as three-quarters of an inch a year.

7. In the acquired as against the congenital form the intellectual development is usually less retarded than the physical development.

DISCUSSION.

DR. WALTER W. STRANG, New York.—Dr. Herrman's paper illustrates how when one is looking for certain cases one finds them. When Osler began to look for these cases of sporadic cretinism they seemed to be rather rare. We all get such cases occasionally, but Dr. Herrman has been fortunate in getting so many. The improvement in the mental development of these children was not what we had been led to hope for in the earlier papers on this subject. A very disappointing feature of dispensary work is the difficulty of keeping these patients under treatment. In the Hospital for the Ruptured and Crippled we divide these cases into two classes; the severe, and the less severe or hyperthyroid cases. The increase in the physical development of the hyperthyroid cases under proper treatment is very marked. I doubt if there is any one else who has had as many cases as Dr. Herrman, and his paper will certainly help in making the literature of this subject.

RECURRENT BRONCHITIS IN CHILDREN.

DR. CHARLES GILMORE KERLEY, New York.—Recurrent bronchitis has a factor in common with such conditions as difficult feeding, eczema, recurrent vomiting, and bilious attacks, and is sometimes seen in the children of parents who have suffered from disturbed metabolism. These children bear cow's milk badly, and sugar and fats badly. It has been observed that when the sugar and fats are withdrawn from their diet there is a marked improvement in their condition. The lessened resistance of these children makes them easy victims to recurrent attacks of bronchitis as well as to other affections. They are more apt to have these recurrent attacks of bronchitis during cold weather and this corresponds to the time when elimination is less active. It has been found that 41 per cent. of children with attacks of recurrent vomiting also suffered from recurrent colds. If these children are fed properly they are not much influenced by "catching cold." Not every child would respond to the treatment outlined but it has given very remarkable

results in many cases. The diet should be one low in carbohydrates, containing but little milk, and no sugar. Neither sugar nor milk are necessary after a child has reached the age of one year or fifteen months. Cane sugar did not come into general use until three hundred years ago. Countless millions of human beings have grown up and lived their span of life without it. The history of cane sugar dates back to 325 B. C., when it is shown that it was used in Egypt. It was first only used in medicine and as a condiment in certain foods and drinks. It was only in the eighteenth century that it became popular as a food and then it was considered very much of a luxury. This shows how unnecessary as a food sugar is. In recurrent bronchitis we cut off the cow's milk or give a greatly reduced amount of skimmed milk, and we remove the fats and sugar from the diet. Sometimes a little saccharin is allowed for a brief period. These children are advised to wear linen mesh or light clothing. They belong to the so-called lithemic type and so are given some alkaline and the bowels are kept open. I usually give salicylate or bicarbonate. In certain classes of cases thyroid, one-half a grain twice a day seems to be indicated and gives good results. The patients presented illustrate what the diet outlined may do. Some of the children have been brought from states of chronic invalidism to their present normal, healthy condition by dietetic and hygienic management and are no longer troubled with their recurrent attacks of bronchitis, which in some of the cases were complicated with asthma.

DISCUSSION OF DR. KERLEY'S PAPER.

DR. CHARLES HERRMAN, New York.—In 1905, Czerny of Berlin described under the title of "Exudative Diathesis" a congenital constitutional anomaly the chief characteristic of which was a peculiar sensibility of the skin and mucous membrane to an exudative inflammatory condition which manifested itself in the form of eczema, intertrigo, papular urticaria, a geographical tongue, rhinitis, laryngitis, and bronchitis of the recurring or asthmatic type. In his original communications Czerny did not mention manifestations in the mucous membrane of the gastrointestinal and genito-urinary tract. These have been added since. I believe therefore that it will be better to consider these attacks of recurring bronchitis as simply one manifestation of the exudative diathesis. The condition may be compared in some respects to measles; the cutaneous and mucous membrane manifestations may differ somewhat in character and intensity in different individuals. In measles also the appearance of the eruption on the skin and the manifestations on the buccal mucous membrane, palate, and gums differ, but this difference in appearance is due to the difference in structure of the tissues involved and to the different manner in which these react to the same irritating agent.

In a paper read before the American Pediatric Society in 1911, I described recurring attacks of loose mucous stools in patients pre-

senting the symptoms of the exudative diathesis. Langstein has also described such cases and Dr. Kerley cites a few in his recent book on Pediatrics. In the same paper attention was called to the frequency of sprue in infants who later showed the other manifestations of this diathesis. Czerny in a recent discussion also mentioned this association. Finally the blood shows a distinct eosinophilia in those patients who present cutaneous manifestations and in those with attacks of bronchitis of the recurrent and asthmatic type.

In his original paper Czerny outlined the dietetic treatment of these cases as follows: For the young infant breast feeding should if possible be continued. If cow's milk must be given it should be in smaller quantities and low in fat. No sugar should be added. Cereals and broths should be given early. For older children cereals and vegetables, very little milk, no cream or butter, no sugar or eggs.

In their valuable monograph on vagotonia, Eppinger and Hess include the manifestation of the exudative diathesis in infant as due to vagotonia. On this basis Krasnogorski has given atropine in these cases with excellent results, especially in those cases with eczema and recurrent bronchitis. As pointed out by Jacobi, many years ago, in order to obtain beneficial effects, it is necessary to give this drug until distinct physiological effects are observed. It is remarkable what large doses may be given if gradually increased. I have used the treatment in a few patients with very satisfactory results.

A word with regard to the removal of adenoids and enlarged tonsils which are frequently present in these patients. When we remember that we are dealing with a congenital constitutional anomaly and that the mucous membranes still retain their peculiar sensibility after the removal of the adenoids and tonsils it is not surprising that the child should continue to have its attacks of rhinitis, pharyngitis, or bronchitis. In these patients dietetic and hygienic treatment are more important than surgical and medicinal treatment.

Thyroid therapy has long interested me and it is easy to see why in such cases it has given such good results; it is because of its marked stimulating effect on metabolism.

DR. ANNA W. WILLIAMS, New York.—Do these children with recurrent bronchitis show a tendency to follicle formation in the conjunctiva as in the nasopharynx?

DR. DEWITT H. SHERMAN, Buffalo.—It is most interesting to learn of the influence of toxicity due to gastrointestinal fermentation upon the upper respiratory tract. The focal point of this intoxication seems to center in the follicles, with changes in the mucous membrane not inflammatory in type. In those cases that I have seen a reduction in sugars or fats, either one, is productive of good results.

Is not the name chronic bronchitis a misnomer? Does not the trouble lie more in the follicles at the base of the tongue or rather adjacent parts? I speak of this since local treatment is so beneficial.

Dr. Kerley mentions rheumatic pains relieved by the reduction of fats and sugar, allowing a moderate amount of skimmed milk. Do I understand that he considers the rheumatic pains to be relieved by the rather high proteid diet he seems to give or to the alkalies and salicylates he gives in association with the diet?

DR. THOMAS S. SOUTHWORTH, New York.—Dr. Kerley has spoken of older children and that certain of these children with chronic bronchitis had asthma. I am not speaking of the older children, but in very young children asthma may be due to anaphylaxis from cow's milk. Such a case came under my observation last summer in an infant on a mixed diet, part breast milk and part cow's milk. It was evident in this case that the asthma was due to the cow's milk proteid because on doing away with the cow's milk the asthma was relieved. Such cases of allergia are undoubtedly extremely rare, but the possibility should be kept in mind.

DR. CHARLES G. KERLEY, New York.—In reply to Dr. Sherman I would say that he has assumed that I meant a high proteid diet. The diet employed was not a high proteid diet but only an average one. With the milk skimmed and the quantity reduced the proteid content of the diet is reduced. Red meat was allowed three times a week, chicken twice, and fish once. As to the inhalations, they were used only during the acute period for two or three nights. These cases were chronic cases and had been going on for years, so the inhalations were not responsible for the cures. All the patients have been treated by various physicians and were not my own patients, so the condition could not be considered acute in any sense.

In reply to Dr. Williams' question, I have not found these children more liable to conjunctivitis.

As to the coated tongue depending on the gastrointestinal condition, there was no manifestation of intestinal disturbance at the time of the attacks of bronchitis. The urine was negative and showed nothing and there was a normal bowel action, and yet the tongue was coated regardless of whether there was constipation or not, or a good appetite or not. In talking with a physiological chemist I asked him what happens when in a child on a diet of highly energizing food, fats and carbohydrates, these are not transformed into heat and metabolic water in the normal way. He replied that intermediary products are formed. I cannot find out what intermediary products are. Where there is incomplete oxidation there may be acidosis just as in starvation of carbohydrates. When there is incomplete oxidization there is acidosis just as when there is carbohydrate starvation. As to the classification of Czerny which he calls the exudative diathesis, he makes it cover too much. The diet described gave complete relief in about 50 per cent. of the cases, a decided relief in many more, and was a flat failure in some instances. One should take a careful history of these cases of recurrent bronchitis and often it will be found that they are getting four or five times what the carbohydrate content of the diet should be.

CAUSES AND TREATMENT OF CHRONIC CONJUNCTIVAL AFFECTIONS IN CHILDHOOD.

DR. ANNA WESSELS WILLIAMS, New York.—At present the comparative incidence of chronic conjunctival affections throughout most of the world is not great. But in certain areas practically all the natives exhibit more or less chronic lesions in the conjunctiva, and chief among these is trachoma. Several such areas exist in our own country, as in the Kentucky mountains and on some of our Indian Reservations, and many of our immigrants come from such areas in the Eastern Hemisphere. Therefore, it behooves us to be mindful of it especially in regard to its etiology and prophylaxis.

Until recently, in New York City, chronic conjunctival affections and trachoma were almost synonymous; for in the great majority of these chronic conditions, follicles are present, and when follicles are found on the inner surface of the lids the condition is called granular lids. This meant and still means to some, I am sorry to say, trachoma. Thus New York, especially on the lower East Side, had the reputation of being a hot-bed of trachoma. For the past four years we have been making a concentrated study of the chronic conjunctival affections in the children of the East Side of the city, and as a result we have shown that the great majority of conjunctival follicles, however many there may be, and wherever situated, are under our conditions of study benign.

By our conditions of study I mean that during the whole time these cases were under observation we sought out and treated, in their homes as well as at the clinics, all cases showing secreting conjunctivitis of whatever degree, but particularly the acute cases. Among the 2500 and more cases of folliculosis (follicles on an otherwise apparently normal conjunctiva) only about 300 have subsequently had from time to time an added infection (follicular conjunctivitis); among the 700 or more cases that have first presented themselves as follicular conjunctivitis, 100 have later shown thickening of the conjunctiva, due to apparent hyperplasia (papillary conjunctivitis, formerly called acute trachoma); among 350 cases first presenting themselves as papillary conjunctivitis, only ten have shown cicatricial changes and these are complicated by the fact that they had earlier had the operation of expression. The chief cause of the more intense conditions according to our findings is infection with hemoglobinophilic bacilli. The influenza bacillus is the type of this group of microbes, and we have found that the Koch-Weeks bacillus belongs to it in a strict sense. It is this bacillus which is the cause of acute contagious conjunctivitis or "pink-eye." The bacilli found in our acute contagious conjunctivitis cases, and we have studied about 500, are absolutely indistinguishable from those found in our chronic cases, therefore we may conclude that these chronic cases act as carriers for the acute, and that the uncared for acute cases may become chronic cases. Hence our reason for hunting up acute cases and following them up until we are sure of cure.

Our conclusion that these hemoglobinophilic bacilli are the cause

of many of these more chronic conditions as well as of the acute was strengthened by finding the famous trachoma inclusions coincidentally with these bacilli so frequently at certain stages of inflammation, and that morphologically inclusions and bacilli have a similar cycle of growth. We have found these inclusions in a certain number of cases of acute conjunctivitis. Similar cell inclusions have been found in gonorrhoeal ophthalmia, but we have shown that the gonococcus also in its growth may show granular changes similar to those seen in the cell inclusions in these cases, so we have come to the conclusion that trachoma inclusions are simply nests of growing bacteria in the epithelial cells of the conjunctiva under certain conditions, hemoglobinophilic in some cases, gonococci in others, and possibly a few other bacteria in others.

If our hypothesis is true it means that we must more than ever try to establish practical measures for caring for the acute conditions, as the best prophylaxis for the chronic. In the homes of the well-to-do this is done, though I do not believe physicians as a whole realize the importance of being sure of a cure before the case is dismissed. The dispensaries under the present system are not adequate to care for the large number of cases that come from the homes of the poor. The Health Department is not yet adequate. Perhaps the ideal way is coöperation between the Health Department, the Education Department, and the dispensaries.

In the meantime we propose an extension of the school clinic plan, which we have started experimentally in Public School 21 and of which Dr. von Sholly will tell you.

As to the treatment of eyes that already show marked chronic changes when we first see them, we do not differ materially from the methods given in the best text-books on ophthalmology. But we emphasize the individual factor and give on the whole much less energetic treatment than is recommended. With our rules of hygiene carried out and our cases protected from reinfection from acute cases in the homes, it is surprising how little treatment the majority of these cases seem to require.

DISCUSSION.

DR. ANNA I. VON SHOLLY, New York.—In following up into the schools and homes, the children under our observation we came upon the defects in the system. When the children were excluded from the schools they were free from authority and took treatment or not as they felt inclined. Those with no subjective symptoms found the constant urging of the nurse with threats of exclusion irksome and so pretended to be under treatment when they were not. The principals complained that the excuse of "sore eyes" was a favorite one for absence and often they were forty or fifty children out of one school at a time, excluded for "sore eyes." On discussing the situation we concluded that the exclusion principle was an inadequate one in the prevention of infection. The important thing was to get the child early in the disease and to keep him

under constant treatment, get as quick a cure as possible, at the same time teaching him how infection was carried and how to care for the eyes and person. Negotiations with the Board of Education resulted in special ophthalmic classes to which cases needing segregation could be transferred and exclusion abolished. In October, 1912, an abandoned school house was remodelled and fitted out for an Infectious Eye Disease Clinic and classes. At this time Mr. Doty of School 21 asked that an Infectious Eye Disease Clinic be established in his school in Mott Street. Clinics were held here twice a week during school hours and the children were brought in groups under a monitor who also brought the list of names and homes. There was a nurse in attendance to instill the prescribed medicine twice a day during school hours. Those who do not come are reported. This keeps the children in close touch with the nurse and the principal. The neglected cases or the infectious cases with secretion are either segregated in the class room, excluded to report when sent for, or sent to special ophthalmological classes. Benign cases report once a week or less often. They are given boric acid solution at home and other members of the family privileged to come for treatment. When the cases are segregated in the schools special care is taken that banisters and side walls are washed and that the child washes his or her own desk and chair; this is for the educational effect. Personal hygiene is taught. The folder system of records is kept. In the ophthalmic school the clinics are held once a week after school hours. These clinics are still under the control of the Division of Laboratories but we would recommend that they be extended to the rest of the city and their care transferred to the Division of Child Hygiene. In the year 1912-1913, we had 312 pupils in the special classes; the longest stay in the class was nine months and the shortest two days. There were only three pupils readmitted after discharge. From Sept. 19, 1913, to April, 1914, there were 155 pupils; the longest stay was 117 days the shortest two days. It would require a longer time, however, before they could say that the incidence of the disease had decreased.

DR. LOUIS C. AGER, Brooklyn.—There is no use wasting time in praising this admirable research work, but when it comes to practical conclusions other things must be taken into consideration. Several years ago we were inclined to think that many of the cases excluded from the schools as trachoma were not that disease, but the enthusiasm of the Health Department was centered on that question at that time and they were very decided on the subject of exclusion. In considering the figures presented, it is necessary to make allowances for the personal element as the examinations are made by different physicians.

We do not know whether trachoma comes in cycles or not, but we do know from the reports that very vigorous treatment has been used and this, to say the least, is unnecessary and undoubtedly some superficial cicatricial contractions are due to too vigorous treatment.

SUBACUTE AND CHRONIC ENTERIC INFECTION.

DR. ELIAS H. BARTLEY, Brooklyn.—Toward the close of the heated term it is not at all uncommon to see persons, both children and adults, suffering with subacute or chronic infection of the intestinal contents with intestinal catarrh. These were mostly persons who have suffered one or two acute attacks of diarrhea during the summer. They have only partially recovered, retaining an infection which is frequently attended with more or less acute exacerbations. In these cases there is always bacterial infection of the intestinal contents sooner or later. It is a common experience in children's hospitals and nurseries that children will recover from acute diarrheal disease, and if kept in the hospital will suddenly show a rise of temperature and get sick again. Whether this is a reinfection or an outbreak of the original infection it is difficult to say, but in most cases I believe it to be the latter. Associated with these attacks there is loss of weight, marked anemia, loss of appetite, or an abnormal appetite, and irritability of the nervous system. Some cases continue to lose weight because they seem to have lost the ability to absorb food. Any of the organisms found in enteric disease may be present. Streptococcus infection of the intestinal canal has been but little studied. Epidemics have occasionally been mentioned as occurring in hospitals and day nurseries, where it has usually been disastrous. In the chronic cases studied by cultures from the stools, but three organisms grew on plates. These were the hemolytic streptococcus, the colon bacilli and one other not identified. The stools were very offensive. One patient had a marked anemia, septic pneumonia and otitis media; another had a double otitis media, symptoms of meningitis, but finally recovered. The red cells on two occasions were 3,000,000 and the total leucocytes were about 9000. One of these cases is improving, having been under observation for over six months, and the other was lost sight of.

For our purposes we may divide these cases into three groups: 1. Those in which there is chiefly carbohydrate fermentation with the production of organic acids, much flatus, colic, and a tendency to diarrhea and a frequent production of acidosis, or acetonuria. 2. Those in which the proteoclastic organisms have gained the ascendancy, and the lactic and butyric have not kept pace with them. The intestinal contents are alkaline, there is usually less flatus and colic, but more fever, toxic symptoms, and more profound nervous disturbance. 3. The cases of streptococcus infection and perhaps other highly toxic infections. The second and third groups are those that give us most concern. In these I regard the indigestion as secondary to the infection. There is some catarrhal inflammation, most prominent in the lower ileum and upper colon where we know the organisms are always most abundant and active. There is, in protracted cases, fatty degeneration of the liver and kidney. How much toxic action there is in these chronic cases it is difficult to say. In those cases attended with fever and prostration we are

warranted in assuming that there is a toxic element. In no other way can we explain the infection of distant glands, the occurrence of bronchopneumonia, skin eruptions, boils, and the various neuroses, such as tetany, chorea, etc.

The treatment of these cases is largely dietetic, although drugs have an important use. There are three indications in the treatment of chronic putrefactive fermentation on infection of the gastrointestinal tract: 1. To modify the intestinal culture medium. 2. To diminish the activity of the organisms by the use of antiseptic drugs, or by the implantation of foreign antagonistic bacteria. 3. To evacuate the bacteria and their toxins and mucus by irrigations and laxative agents.

As the proteoclastic organisms are believed to produce the more dangerous side products or cleavage products, it would seem logical to withhold meat products, eggs, and predigested meat preparations. The so-called antiputrefactive diet consists of cereals and milk, or a lactofarinaceous diet. When the harmful bacteria are such as act on the proteins, it is logical to withhold the proteins. Casein and lactic acid are the chief beneficial agents. Cow's milk fat, on the other hand, is a disturbing element in many cases and skimmed milk or partly skimmed milk is in many instances better borne than whole milk. Other fats, such as butter, bacon fat, or olive oil are better borne than milk fat, probably because of the vastly less surface exposed to the action of bacteria.

Our second indication is to diminish the activity in the bacteria by antiseptic drugs. It is admitted on all sides that the use of antiseptic drugs in dealing with intestinal infections is disappointing. As the chief putrefactive or anaerobic organisms are active only in the lower portion of the ileum and in the upper half of the colon, only the very insoluble antiseptic agents reach the seat of their greatest numbers and activity. Among these insoluble available antiseptics are a few of the bismuth salts, such as the subsalicylate, beta-naphthol bismuth, thioform, eudoxin, etc. Thymol salicylate, guaiacol carbonate, creosote carbonate, are some of the available aromatic antiseptics. Hexamethylenamine is becoming popular, but it is too soluble and hence does very little good except in the stomach. More efficient than any of the above is ichthyol. Ichthalbin, ichthioform, and ichthargan are nearly tasteless and powerful antiseptics and are nearly soluble in water. They may be given in doses of 1 or 2 grains three times a day. They must be given for a long time to be of much service. Calomel is a well tried remedy, and one that reduces the indican and ethereal sulphates in the urine. It is a very efficient remedy when combined with sodium benzoate and in this form it should be given for several days in laxative doses. The indication is to evacuate the bacteria and their toxins by colonic lavage and laxatives. Irritation of the bacteria causes an abundant secretion of mucus in which the bacteria find a good nidus for multiplication. The attempt to disinfect a mass of this gelatinous material is manifestly futile. There is no other alternative but to sweep it out. The laxative chosen should be nonirritating and

should not be given in more than a laxative dose. We naturally turn to castor oil or olive oil for such a laxative. Castor oil is attended with the evacuation of more mucus than is evacuated in any other way. The emulsion of castor oil of the National Formulary, containing about one-third its volume of oil is a palatable mixture for infants and young children. I usually give a daily mild laxative dose of this or a similar emulsion.

The transplantation of foreign bacteria or yeasts into the intestinal culture medium has been disappointing in my hands in these chronic cases. It is only in exceptional cases that I have seen much benefit. I have repeatedly tried the *B. bulgaricus* and have repeatedly failed to accomplish relief.

DISCUSSION.

DR. H. A. GRIBBON, Poughkeepsie.—We all have these cases run an acute course and do not clear up. As regards the treatment of acute infection, Dr. Bartley has covered the ground well. I do not use as many drugs as he has mentioned, neither do I believe that he uses them all. I take exception to the salacetin. Some of these cases of continued diarrhea following acute infection are not true infection but anaphylaxis due to primary sensitization to cow's milk. In many cases in which children are sensitized to cow's milk it is difficult for them to get over it and it is my custom to give very small quantities of milk at first and to proceed to increase it very cautiously. Sometimes the diarrhea is toxic through absorption. It is not well to withhold nourishment too long. One must find the opportune time to recontinue feeding. The use of albumin milch had given very good results, the children seemed to stand this casein better with the exception of those who have been sensitized to it. Another form in which proteid is borne is boiled and skimmed milk. This may be given after five or six days. If the case is one of long standing then we may have to wait longer before giving it. As to the bacillus *Bulgaris*, I have had fairly good results with it. It has been useful among the poorer people. It is something that they can give and so comes in very conveniently in these cases in which drugs are of very little use. If an astringent is wanted as in mucous colitis a mild one like hydrated bismuth is beneficial.

DR. DEWITT H. SHERMAN, Buffalo.—Dr. Bartley referred to cases of streptococcus infection, but did not mention the use of vaccines or serums. The treatment should surely be as supportive as possible. Second, as far as the diet is concerned the soil inhibitive for the bacterial infection should be used. To assist further, drugs as antiseptics amount to little.

We used vaccines in Buffalo, not only without good results but often with decidedly bad results, the condition of tetany occurring in two or three instances. But as regards serums the results seemed different. While not as useful as in selected cases of acute tonsillitis, yet they seemed often to turn the tide and to assist in a much more rapid and uninterrupted recovery. I feel, that serums in proper cases are deserving of serious consideration.

DR. JOSEPH ROBY, Rochester.—It has occurred to me that possibly the use of gentian violet might be effective where the infection is due to Gram-positive organisms. The effect of gentian violet on Gram-positive organisms in the test-tube is so remarkable that we may in the future hope something from it; however it does not do so well in the presence of blood serum as in the agar tube.

DISCUSSION OF DR. BARTLEY'S PAPER.

DR. THOMAS S. SOUTHWORTH, New York.—Not much has been said, in regard to Keller's malt soup but it has a definite value in the treatment of subacute and chronic cases. It may be made up with fat-free milk and supplies the necessary carbohydrates in a readily absorbed form to take the place of the fat. Aside from Eiweiss milch there is nothing that changes the bacterial content of the intestinal tract more than malt soup. It is well borne in the mucoid type of disease. In the group of cases classed as colitis the child should not be allowed to reach the extreme point of reduction in weight that formerly prevailed. This can to a large extent be prevented by proper food and by not waiting too long before giving the types of food necessary to keep the fat of the body up to a reasonable point.

DR. W. MORGAN HARTSHORN, New York.—From our experience in the Roosevelt Hospital last summer I wish to add a word emphasizing the value of albumin milk in acute and subacute toxic cases. We had several cases, I remember at least four, which had resisted our usual treatment. The use of protein milk obtained from fat-free milk, prepared by the Walker-Gordon Company was followed by immediate and striking effect.

DR. ELIAS H. BARTLEY, Brooklyn.—We used the albumin milk but found that we got as good results with one form of fat-free milk as with another. We had one instance showing the virulence of these infections. We had a very sick baby and it infected two others near by, both of whom died, while the first child got well. As to the vaccines, we have not used serum but have employed autogenous vaccines from hemolytic streptococci and could see no benefit. Malt soup was also tried but finally we got the best results from a diet of pure carbohydrates excluding milk.

THE EARLY DIAGNOSIS OF CONGENITAL SYPHILIS.

DR. CARL G. LEO-WOLF, Niagara Falls.—During the past winter I had the good fortune to work at the Orphan Asylum of the City of Berlin, Germany, under Professor Finkelstein to whom I am indebted for the wonderful material of this institution and for many valuable suggestions. In this paper I will confine myself to those symptoms of congenital lues which are often overlooked, but which if found in the first days or weeks of the child's life are of great diagnostic importance.

The transmission of congenital syphilis may be either germinative or postconceptional. For the germinal transmission we have three possibilities; (1) The mother may be well and the father has lues, sperm transmission, (2) the mother has syphilis before conception and the father is well, ovular transmission, (3) mother and father are both luetic, mixed transmission. In postconceptional transmission of syphilis both the sperm and the ovum are well and therefore also the fetus, but the mother is infected during pregnancy and transmits the disease to the fetus through the placenta or at the time of parturition. This last mode of transmission which is quite important for us has been neglected so far. It may account for those cases in which the Wassermann reaction remains negative for a few weeks after birth and then becomes positive. The gravity of infantile syphilis is shown to be the greater the more recent the infection of the parents, and, *vice versa*, the severer the disease in infancy the earlier will it appear. We will concern ourselves with these children who are born apparently clean, but in whom we can find on careful examination changes in different organs; also in those in whom the intrauterine course of the disease has run out and who are born apparently healthy so that we cannot find anything abnormal in any of the organs, but who are weakly and do not thrive and who will later on have relapses of the disease, and, finally, in those children who are born healthy, but who are infected and in whom the disease will appear sooner or later.

The writer gave a recital of the symptoms that may be found in congenital syphilis, but stated that some of these taken by themselves were not pathognomonic. He called attention to the dilated coronary veins in the scalp, especially the coronary vein, and next in frequency the vein at the bridge of the nose; to the saddle nose, which is a very characteristic sign of congenital lues, but not by itself alone; the rhinitis and to the optic neuritis. The latter symptoms would be found with relative frequency. Japha found it in 66 per cent. of the infants with congenital lues and Hein in 83 per cent. The latter author states that in those syphilitic children who cry a great deal the ophthalmoscope will show the cause for this to be pain caused by latent papillitis. On the skin we find diffuse infiltrations like the leukocyte infiltrations found in inflammatory conditions. The upper layer of the epidermis will have a glistening appearance and this swelling leads to cracking of the upper layers of the epidermis. The rhagades thus caused in extreme cases are usually found on the eyelids, on the anus, and at the roots of the nails. They must not be confined to the red of the lips but go through into the surrounding epidermis in order to be characteristic of congenital lues. In case this infiltration does not lead to the formation of rhagades it will produce a swelling paralleling the border of the lips, the color of which is an opaque white. This form of infiltration will be found on the trunk also, but its most frequent location is on the palms of the hands and the soles of the feet. Here we observe a bluish discoloration which in some cases may cover the whole surface of the soles of the feet, while the

glistening parchment-like appearance is mostly in evidence on the outside of the sole and can be brought out best when we attempt to wrinkle the skin here. It is of the greatest importance to differentiate this infiltration caused by syphilis from the decubitus frequently found on the feet of infants, and here again especially on the heels. We further find this same kind of diffuse infiltration around the roots of the nails, but the paronychiae so frequently observed in syphilitic infants are due to secondary pyogenic infections of these infiltrations and are therefore not properly classed among the symptoms of congenital lues. The color of the infants is a peculiar gray which can easily be recognized when compared with the rosy complexion of healthy infants. After the sixth week of life the skin is apt to present the "café au lait" color. To mistake this peculiar color for icterus neonatorum is impossible if we examine the cornea.

BRIEF OF CURRENT LITERATURE

DISEASES OF CHILDREN

Unusual Type of Acid Intoxication in Infants.—J. A. Abt (*Amer. Jour. Med. Sci.*, 1914, cxlvii, 86) calls attention to a series of nine cases of severe acid intoxication, usually terminating fatally, and occurring mostly in large previously healthy infants at about the weaning period. In some cases the weight is stationary for several weeks before the onset. If breast fed, they show signs of hunger and dissatisfaction because the milk is scanty or of poor quality. Some were artificially fed before the onset of this illness. The disease is ushered in by more or less diarrhea and nearly always vomiting with restlessness, and moderate fever, rarely over 101° during the first days. Later it averages between 99° and 100° . On the second or third day there are some abdominal distention, dyspnea, rapid respiration and pulse. The liver is markedly enlarged and firm. The urine contains albumin, hyalin and granular casts, acetone and diacetic acid. In one case leucin and tyrosin were found. About the third day stupor is noted, gradually deepening into coma. Leukocytes vary between 9000 and 12,000 with normal differential count. Toward the close of the disease intestinal atony may occur so that no movements can be induced. Abdominal distention increases and cyanosis and dyspnea are marked. Unconsciousness continues and vomiting may persist. When death takes place it usually occurs within four or five days. The writer believes that this disease depends upon some derangement of metabolism resulting in the production of toxic products. The familiar occurrence of the disorder in one of his cases suggests that an inherent weakness of cells or organs may exist, as in diabetes.

Pellagra in Early Childhood.—W. Weston (*Amer. Jour. Dis. Child.*, 1914, vii, 124) says that nearly all the Italian pellagrologists who mention children call attention to the fact that infants born of

pellagrous mothers are under weight and that a large percentage of them die before reaching the fifteenth month; among the more common causes of death are gastroenteritis, bronchitis, bronchopneumonia and eclampsia. Cases in infants are being observed so much oftener now than they were even a year ago that we are led to the conclusion that pellagra in infants is by no means a rare occurrence. Given a child with a red tongue, fissured lips and diarrhea, together with such nervous symptoms as headache, insomnia, restlessness, paresthesia and brisk or absent knee-jerks, or the more advanced symptoms of spasms, rigidity and photophobia, the diagnosis of pellagra should be considered. Simonini lays great stress on muscular weakness in the lower extremities as an important early symptom of the disease. Not infrequently while the final diagnosis based on such a group of symptoms as above described is still being held in abeyance, the development of an erythema, however slight or transient, on the dorsi of the hands or feet, on the knuckles, elbows or wrists, or at the angle of the thumb and index-finger, as well as over the patellæ, serves to confirm a tentative diagnosis of pellagra. In a region where pellagra is endemic, this kind of diagnosis is much less hazardous. If the erythema be present, without one or the other of the triad of symptoms, the diagnosis ought to be made. When the case presents the association of intestinal, nervous and skin manifestations—the classical triad—then the diagnosis of pellagra is inevitable. The younger the infant when the disease fully develops, the less favorable is the prognosis. Infants at the breasts of pellagrous mothers sink rapidly into marasmus unless given a change of diet. Children from four to ten years of age seem liable to a milder type of the disease, and when given the benefit of generous dietary and change of environment, they usually recover. They should, however, be kept under observation for several years, since the problem of recrudescence in pellagra seems still to be one of uncertainty as regards permanent prophylaxis. Nurslings, either with or without the suspicion of having pellagra, should usually be weaned from pellagrous mothers. Not only should a change of diet be ordered for such infants, but in view of our uncertainty as to the real cause of the malady, a change of environment should be ordered, or if this is not possible, patients should be placed in the best hygienic surroundings. Among hygienic measures for the treatment of pellagra, hydrotherapy ranks high. The influence of sunshine in developing the erythema points to its avoidance as a preventive measure. Local measures, such as calamine lotions, are of advantage in alleviating the acute dermatosis. Internally, tonics such as arsenic and iron are of benefit. The frequent association of intestinal parasites should be kept in mind and, when discovered, eliminated. Other associated conditions—cretinism, malaria, tuberculosis and syphilis—should always be sought for, since pellagra seems often to select weaklings.

Spasmophilia, with Especial Reference to Familial Reactions and Repeated Absences.—In all of the cases of infants, one year or less of age at the breast whom J. P. Sedgwick, (*Amer. Jour. Dis. Child.*,

1914, vii, 144) has examined and found spasmophilic, the nursing mothers have shown definitely heightened electric excitability. Only two of the nursing mothers failed to show such excitability and the children of these women were over two years old. The electric reactions of other members of the families of spasmophiliacs often bear out the frequently made assertion that the condition is hereditary or familial. The writer cites a number of cases in support of this statement. We are indebted to Friedmann for the recognition of the character of the repeated nonepileptic "absences" in children, which so resemble petit mal. He considers that they bear no relation to epilepsy and apparently have nothing to do with hysteria. They are characterized by the following peculiarities: They begin in apparently well children from the fourth to the seventh year, usually suddenly after some excitement, such as fear or operation. They consist of short, light disturbances of consciousness without convulsions and without falling. They come on at first in a great number of attacks (6 to 10 to 100 a day and occasionally at night). The course of the disease is tedious, usually being from seven to eight years. There may be also long remissions. They have no disturbing influence on the mental or bodily development of the child. The "repeated absences" present a good prognosis in that they appear to clear up before puberty even without treatment. It seems that they appear on the foundation of a spasmophilic diathesis as, in the three cases which have been so far recently tested electrically, the increase of electric excitability and cathodal opening contraction with less than 5 milliamperes has been observed. It is possible that one of the writer's cases which shows both petit mal-like attacks and convulsions, may be a link between "repeated absences" and the spasmophilic convulsions. The diagnosis of spasmophilia rests on the electric reactions, convulsions, tetany, laryngospasm, spasmodic apnea, together with the Trousseau, Chvostek and allied phenomena. Not only have we here an aid in the differentiation of these convulsions from those of major epilepsy, but certain cases of petit mal may belong under this heading. Although death does occur in the general convulsions and in laryngospasm, under proper treatment the prognosis, so far as life is concerned, is usually favorable. Thiemich and Mann found, however, that about one-third of these cases show later evidences of injury to the mentality. The accepted treatment consists in the withdrawal of cow's milk with the substitution of breast milk when possible, or carbohydrates in the shape of gruels, and the administration of cod-liver oil and phosphorus. Sedatives, such as chloral hydrate, may be necessary in the active stages. The calcium therapy is not as yet generally used.

Serum Treatment of Gonorrhoeal Ophthalmia in the New-born.—V. Morax (*Ann. de gyn. et d'obst.*, March, 1914) compares his results in the treatment of gonorrhoeal ophthalmia in the new-born with nitrate of silver and argyrol, and those obtained by injections of the new gonococcic serum of Nicolle and Blaizot. His ordinary treatment is the daily use of 2 per cent. silver nitrate solution and hourly washings with physiological salt solution and this has given good re-

sults. Out of 110 cases there were but nine of corneal ulceration with perforation, and out of these nine in six there was ulceration when treatment began. Only a small number of cases have as yet been treated with the vaccine. Its effects on the symptoms have not been encouraging. The writers conclude that if this vaccine is used it should be combined with treatment with nitrate of silver and argyrol, if we would save the largest possible number of eyes.

Rickets and Osseous Dystrophies in Animals Born of Parents Deprived of the Thyroid.—Henri Claude and J. Rouillard (*Presse méd.*, March 21, 1914) have removed the thyroid in rabbits, and then have allowed the animals to procreate. In the young of such animals they have found changes similar to those found in human rickets. These were large abdomen, intestinal distention, congested liver, small spleen, large hemorrhagic kidneys, pale and atrophied muscles, normal nervous system, normal internal glands, and diminution of size of the skeleton. There was a distinct rachitic rosary in one rabbit. The bones of the legs were curved, the epiphyses thickened, the pelvis contracted; the bones of the skull were smaller and very thin, teeth malformed, etc. In the bones there were tumefaction of the costochondral junction: intense vascularization of the flat bones of the skull, thickened epiphyses, incurvation of diaphyses, and softening of the bones. Thus in two successive generations of thyrosectomized animals there were manifest arrest of development, and bony lesions comparable to rickets. The coexistence of rickets with other forms of dystrophies has been shown clinically by other writers.

There is a manifest relation between rickets and failure of the function of the thyroid gland. Opotherapy has been found of value in rickets where the thyroid was small; thyroid extract has given excellent results in increasing growth and developing the nervous system through stimulation of nutrition. Rickets would seem to accompany intestinal toxi-infections, and pluriglandular insufficiency, with direct rachitic heredity. The authors believe that their experiments have shown that in the pathogenesis of rickets insufficiency of the thyroid hereditary or acquired, plays a prominent part. The descendants of victims of exophthalmic goiter are victims of poor development and congenital debility. Also in countries where goiter is common the children of goiterous women show rickets, myxedema, obesity and other forms of malnutrition. Thus hereditary dysthyroidism should have a prominent place as a cause of infantile dystrophies.

Experiments with Rosenbach's Tuberculin in Internal Tuberculosis of Children.—Albert Stommel (*Arch. f. Kinderheil.*, Bd. 62, H.V.—VI.) gives his results in the treatment of twenty-two cases of internal tuberculosis, in children; eighteen of lungs and bronchial glands and four of abdominal tuberculosis. This tuberculin is made from a six to eight weeks old culture of tubercle bacilli grown with trichophyton culture, and thus attenuated so that it is far less poisonous than old tuberculin of Koch. The results are tabulated and histories of cases given in full. Out of the eighteen pulmonary or bronchial gland cases there was marked improvement in six cases, slight in four cases, while five showed no change, and three

became worse clinically, two dying. In one case there was a disappearance of lung signs, but these were only slight on entrance. All the others remained unchanged or slightly changed, and the von Pirquet reaction was present after as well as before the treatment. There was no effect on the fever. The improvement in general health was only such as would be expected in the more hygienic surroundings of the hospital. Increase in weight was not marked. The author concludes that in his cases the effect of the Rosenberg tuberculin was not such as to encourage its use as a curative measure in tuberculosis in children. In some cases the effect of the treatment was unfavorable.

Protection of the Infant against Tuberculosis.—P. Nobecourt, and G. Schreiber (*Arch. de méd. des enf.*, Apr. 17, 1914) consider it of the greatest importance for its protection against tuberculosis to separate a young child from any relatives who have tuberculosis. He is not born tuberculous: tuberculosis is exceptionally hereditary. It is contracted in infancy from the surroundings. It may be prevented if the child is removed from the infected home. The proportion of infants infected increases rapidly with age, therefore to be effectual, removal must take place early. There should be centers for placing out infants who are in danger of tuberculosis; parents of infants born in infected surroundings should be induced to remove their children from the home, and place them in the country. There should be centers for the bringing up of children, well superintended, and easily inspected medically. They may be in the country, in the mountains, or at the sea shore.

Treatment of Eczema of Nurslings with Pellidol Ointment.—Erich Rominger (*Arch. f. Kinderheil.*, April 1, 1914) has found good results in skin diseases of infants from the use of pellidol which contains a substance related to scarlet red, diacetyl-amido-toluol, and has a good effect on the epithelial structures. The author made use of this ointment in fifteen private cases of skin disease, using the salve alone without changing the diet and hygiene. In the clinic there were fourteen such cases—five of eczema, seven of intertrigo, one of pemphigus neonatorum, and one of impetigo contagiosa. The crusts were first removed with oil, and the pellidol salve smeared on gauze and applied to the diseased surface, being changed daily, and the patient being prevented from scratching by covering the hands with sleeves. In eczema of the head and face the exuding surface soon became dry and healthy epithelium covered it. Wet cases received the most benefit. If a 1 per cent. salve was used the effect was good, while a 2 per cent. salve caused redness and irritation, which rendered healing slow. In the seven cases of intertrigo, healing soon took place. The other skin diseases were similarly affected.

Eosinophilia and the Exudative Diathesis.—A. Kroll-Lipschutz (*Monatsscler. f. Kinderheil.*, 1914, Bd. xii., Nr., 10) says that the lymphatic temperament includes children who show skin affections, mucous membrane affections, and symptoms due to the lymphatic apparatus. The author has examined children subject to eczema,

mucous membrane diseases, etc. His conclusions are these: Eosinophilia is constant in children with eczema, recurrent urticaria, and asthma. In older children who have had eczema but have recovered, the eosinophilia persists. Eosinophilia remains a constant blood condition in children who have suffered from skin troubles. Thus eosinophilia is a coordinated and constant symptom of the skin manifestations of the exudative diathesis and may rest on a constitutional basis. In recurrent bronchitis and pharyngitis in small children without typical asthma and in obscure dyspepsias no eosinophilia is found. Eosinophilia accompanies constantly the skin manifestations of the exudative diathesis, but not the mucous membrane and stomach symptoms.

Pedagogical Therapeutics.—J. Girstenberg (*Monatsscler. f. Kinderheil.*, 1914, Bd. xii., Nr. 10) gives many interesting examples of treatment of children who were deficient in speech, or in mental and moral directions by constant companionship combined with tactful teaching, and general hygiene. These cases have resulted in cure, and the young patients have become able to compete with their equals in age. Among the troubles successfully treated in this way have been enuresis, incontinence of feces, general nervous symptoms, deficiency of moral sense, paralexia, and various psychopathies. In all these cases a personal influence was exerted, and advantage was taken of suggestion, and the reward of approval from a valued friend. Late hours and excitement must be eliminated, and the child removed from his familiar surroundings. At the same time fresh air must be given by means of walks and excursions with the preceptor, who must be emphatically his best friend. Self control and subjection of the ego must be enjoined. The results of the author's therapeutics have been excellent, and a new field of work is opened to the conscientious psychologist in this direction in the treatment of difficult and backward children.

Value of Blood Picture in Early Diagnosis of Measles.—W. P. Lucas (*Amer. Jour. Dis. Child.*, 1914, vii, 149) says that if we hope in any way to prevent the spread of measles, it must be done through an earlier recognition of the disease than is at present possible by clinical methods alone. That is, we must learn to recognize the disease before the stage of lacrimation, coughing and sneezing, and profuse serous nasal discharge, for it is in this early pre-eruptive stage that the infection is most easily carried. The writer's observations in nine cases that came down with measles and in ten cases that were in the wards at the time, but who did not come down with measles, led to the conclusion that blood examination under such conditions is of definite value. There is an early change in the blood picture which may be taken as the first evidence of the infection. This consists in a change from the ordinary lymphocytic predominance which exists normally in infants' blood, to a relative increase in the percentage count of the neutrophilic type of cell. Though there is an actual diminution, here also the diminution in the lymphocytes far exceeds that of the neutrophils, so that there is a complete reversal of the blood picture. The normal percentage of lympho-

cytes in infants' blood ranges from about 55 to 70 per cent. of the white blood cells; whereas the neutrophils range from about 25 to 30 per cent., the large mononuclear cells ranging from about 8 to 15. The earliest sign which appears in the blood of an infant coming down with measles is a beginning reversal of this picture. The reversal usually begins about a week before any visible symptoms of infection occur. The actual reversal has occurred at least forty-eight hours before the earliest signs are visible, that is, Koplik spots, coryza or coughing. There is also a definite constant leukopenia present which sometimes appears eight days before any physical signs, and sometimes appears simultaneously with the physical signs. For this reason it is not so reliable as the cell picture in making an early diagnosis. There appears an ever increasing number of disintegrated cells, which first make their appearance about the time the cell picture begins to change. These disintegrated cells may not be specific, and probably are not specific in measles; but with the reversal of the blood picture, they are to be counted as a definite factor in the early diagnosis. They appear to be in many instances large, swollen cells, with protoplasm breaking up and the nucleus, as it were, water-logged or breaking up into fragments. The shape varies from round to oval, with no sharply defined outline. Granulations are abundant, and they can be seen separating from the nuclei. This combination finding in blood in suspected cases will be of considerable value in the early detection, therefore in the early isolation, of suspected cases.

Contagion of Scarlet Fever after Return from Hospital.—W. Knöpfelmacher and R. Hahn (*Monatsschir. f. Kinderheil.*, Bd. xii., Nr. 11, 1914) have investigated the method of infection of fresh cases of scarlet fever by a child returning from isolation at a hospital. That this is of frequent occurrence has been shown by the statistics of various authors, which give 3 to 9 per cent. of infections. An acute case of scarlet fever contains the virus in blood, throat, nasopharynx, and skin. Rubbing of the virus from the nose and throat into the mucosa of the chimpanzee has shown its undoubted virulence. It is possible also that healthy persons may be carriers of the virus if attending such cases. Or the cured person may carry either his own virus, or a virus obtained from fresh cases with which he comes into contact. Not being susceptible himself he may still carry the germs in nose and throat. The experience of the authors includes cases isolated from 1898 to 1912, 1909 in all. Of these, forty-one cases returning home infected, forty-nine other children in their families, and two mothers. The severity of the epidemic, and the number of cases affected has no relation to the number of fresh cases produced. Most of the children remain a full six weeks at the hospital. A mild case may carry the disease home as well as a severe one. Great care was always taken that the cure of the throat and nose affection was complete before the children went home. The skin was carefully bathed and disinfected and the clothing in which the child came to the hospital was carefully disinfected by steam before it went home, so that the authors believe that it was quite impossible

for either the skin or clothing to have carried the virus. The only means of carriage of the infection that is left is the throat and nose of the convalescent child. The minimum interval between return home and a fresh case was one day, the maximum fifty-nine days, and sixty-seven days. The conclusion of the authors is that the present method of isolation of all cases in one ward is faulty. They believe that each case should be isolated in a separate box, so that no other case may cause fresh infection. This will be expensive and irksome, still it should be tried. For the first twenty days each case should be separately isolated and after that all convalescent cases may be put in one ward.

Recurrences in Scarlet Fever.—Gregoire Jacobson (*Arch. de méd. des. enf.*, April, 1914) contributes to the rare occurrence of recurrent attacks of scarlet fever four cases in one family, all of whom had a second attack. In each one the recurrence was more severe than the first attack. The recurrence took place after several years.

Osseous and Articular Manifestations of Heredo-syphilis.—Savariaud (*Jour. de méd. de Paris*, No. 45, 1914) says that in making a diagnosis of heredo-syphilitic bone disease we must carefully consider the other symptoms of syphilis before being certain of the cause. Whenever we find in a new-born infant a painful affection of the limbs, with juxta-articular swellings and functional impotence, we should think of syphilis. This has been called pseudo-paralysis of Parrot. The bone becomes increased in amount, near the large articulations, and this swelling is very painful. In later years the hyperostosis is in the diaphysis. The long bones, skull, and face may be attacked symmetrically. Pain is present over the superficial bones, especially at night. The hyperostosis forms a shell around the old diaphysis; the canal of the medulla may become obliterated by bone, and bone is denser than normal. The new bone softens, the skin reddens, a sinus forms and fluid exudes. The necrosed bone is eliminated. The tibia is especially involved in syphilis. The second teeth are badly affected; deafness, corneal infiltrations and dental alterations form Hutchinson's triad. Articular trouble occurs especially in the knees. The affection is indolent, and there are no fungosities.

Rachitis and Spasmophylia.—Erich Aschenheim (*Arch. f. Kinderheil.*, April, 1914) gives a study of the calcium content of the blood in rachitic, and nonrachitic children, and in nursing, and osteomalacic adults. The author has proven that calcium is deficient in the musculature as well as the bones in rachitic children. Similar to this condition is the poverty of lime in the brains of the spasmophile diathesis study of the brains and muscles of rachitic and spasmophile children shows them all to be poor in lime. The author concludes that rickets, osteomalacia, and spasmophilia are three closely related, general diseases. In all are found similar symptoms, in all there is an alteration of the metabolism, and especially in rickets and osteomalacia of lime metabolism. In rickets and osteomalacia there exists as a result of the changes in the lime content at a specific disease of the bone-forming structures. Other

organs are affected by the changed lime metabolism. The common pathogenic factor in all three diseases is a derangement of the function of the glands of internal secretion, which preside over the chemical changes. In rachitis it has been shown that there is a disturbance of the function of the thyroid, in osteomalacia a change in that of the genital glands. Spasmophilia shows the disturbance of an unknown gland, probably the parathyroids. These functional disturbances of the glands of internal secretion may be brought about by the most varied agencies, which alone or in combination have a bad effect on the system. Such influences are congenital predisposition, domestication, respiratory troubles, wasting diseases, syphilis, infections, and failure of nutrition.

Family Predisposition to Scarlatinal Nephritis.—Paul Bode (*Arch. f. Kinderheil.*, April 1, 1914) says that there are families in which scarlatinal nephritis is sure to occur in any members of the family which have scarlatina. The cause of this occurrence is not yet clear. Mathies has collected histories of 3000 cases of scarlatina occurring from 1903 to 1911 in the Clinic at Hemberg-Eppendorf, and out of these there were 215 families in which nephritis was evident, and it occurred in 519 members. The author in Riga found out of 3500, 360 families affected thus, with 830 members. One possible cause is that several families get their contagion from a single source, and an especially virulent one to the kidneys. Most authors hold that there is a family predisposition to scarlatinal nephritis.

Treatment of Acute Stenosis of the Larynx.—Guillermo Zorraquin (Paris, 1914) has devised a new tracheotomy tube with a tracheal valve so arranged as to move back and forth with respiration. He gives us first a study of the relative values of intubation and tracheotomy. In the Hospital de Niños, Buenos Ayres he found a mortality of 30 to 40 per cent. in stenosis of the larynx. Intubation is difficult except for an experienced operator, and even he may have to make several attempts. The tube may be rejected and have to be introduced again, or a hasty tracheotomy may have to be done. Tracheotomy gives more air than intubation, and the tube can be retained as long as desired by means of a band around the neck. The intubation tube causes decubitus, and it may be difficult to do without it on account of the changes because of the inflammatory process in the larynx. The intubated child is unquiet, uncomfortable, and swallows with difficulty, especially liquids. The tracheotomized child rests quietly and swallows well. The intubated child must be fed with a tube. Aspiration of bacilli, of cold air, and difficult expectoration may cause pneumonia. In tracheotomy cough is less, and expectoration better. Both procedures are open to objections and should be used only as a last resort. In cases of stenosis it is the inspiration that is long and difficult; expiration is quick and easy. In intubation the respiratory movements are more frequent, and deeper, that is there is a greater muscular effort. The pulse is more rapid, and the arterial tension lower than normal. In many cases enough air does not enter and there is no action of the glottis. The author wished to reestablish the normal conditions

of respiration in stenosis of the larynx: to bring about a positive expiratory tension, with an easy inspiration, at the same time that the heart and lungs are protected; to keep expectoration, voice, and cough: to isolate the initial lesion, not aggravating it, and make gymnastics of the larynx. He added a tracheal valve in the fenestrated tracheotomy tube of Broca, made of a thin plate of mica in front of a small box adaptable to the canula. The mica plate opens the orifice in inspiration, closes it in expiration. Inspiration is through the canula, expiration through the diseased larynx. Respiration is easier, and fuller. The lungs act better, and more oxygen enters them. The author has not as yet used this tube extensively.

Nutritive Value of Proprietary Infant Foods.—The investigation of R. Wheeler and A. Biester (*Amer. Jour. Dis. Child.*, 1914, vii, 169) was suggested by the accumulating evidence that there may be danger in a restricted dietary even when the latter is entirely satisfactory in total energy value and in the proportion of protein, fat, carbohydrates and essential salts present in it. Many of the proprietary infant foods now frankly advertise that they are only partial foods and as such they often prove of value; but not infrequently they form the chief source of nourishment of infants, and medical literature contains numerous records of malnutrition attributed to them. It is of interest to know whether the failure of such a ration to maintain health or to sustain proper growth is due (a) to the character of some of the nutrients, for example, because its proteins cannot supply all of the nitrogen requirements of the organism; or (b) to the absence from it of some essential "vitamine" or "growth hormone." If the difficulty is due to the lack of a "vitamine" the addition of a small amount of fresh milk to the ration might correct the defect; if it lies in the character of the nutrients of the food, it might be necessary to make milk the chief part of the diet and to use the food powder merely as a diluent, as is often advised. In either case the question remains open whether milk alone properly modified would not be quite as satisfactory as well as much more economical. Four typical proprietary infant foods were fed to albino mice, both adult and young animals being used. To adapt it to use by mice each food was modified by the addition of purified casein or of the salts of milk (Osborne and Mendel's protein-free milk) or of both. Two of the four foods seemed to be complete foods (Horlick's malted milk and Nestlé's food), allowing maintenance of constant body weight, normal reproduction and growth more rapid than normal. With Horlick's malted milk a third generation was produced. The other two foods studied, Mellin's food and Eskay's albuminized food, did not prove capable of serving as an exclusive ration. One modification of Mellin's food appeared to satisfy the nutritive requirements for maintenance and for repair in two instances but not for growth.

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ORIGINAL COMMUNICATIONS

POLYPOID CHONDROFIBROMA OF THE FALLOPIAN TUBE, ASSOCIATED WITH TUBAL PREGNANCY.

BY

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(With three illustrations.)

Of all the organs of the body, the Fallopian tube is one of the least subject to tumor formation, primary or secondary, but especially the former. Unquestionably the most frequent primary tumor of the tube is carcinoma, and even this is, as is well known, distinctly uncommon; extremely few cases of primary sarcoma are on record, and the benign growths are likewise distinct rarities. About thirty cases of fibroma or fibromyoma, and quite a number of polyps and papillomata arising from the mucosa have been reported, as have also a few cases of lymphangioma, lipoma, teratoma, and chorion-epithelioma. The small adenomatous growths frequently found at the junction of the tube to the uterine cornu (the "Tubenwinkeladenomyome" of the Germans) are now for the most part considered inflammatory rather than neoplastic in origin. The case which I wish to present here is of interest, therefore, partly from the fact that it is an example of an extremely unusual type of primary tubal growth, but also on account of its possible etiologic relation to the ectopic pregnancy with which it was associated.

Mrs. M. S., thirty-one years of age, was operated upon Nov. 12, 1913, at the Gynecean Hospital, Philadelphia, by Dr. T. H. Erck for tubal pregnancy, the left tube and a portion of the corresponding ovary being removed. The tube measures 9 cm. long, and has a diameter of 7 mm. at the uterine end, this gradually increasing to 3 cm. at the largest point, near the abdominal end. The external

surface is intensely congested; the fimbria are much swollen, and are buried in a mass of blood clot, but are not agglutinated, and the abdominal ostium is patulous. On longitudinal section (Fig. 1), the lumen in the outer two-thirds of the tube is seen to be greatly dilated and filled with a mass of blood clot, in the center of which is a small, thin-walled sac, somewhat less than 1 cm. in diameter, containing a bit of whitish, gelatinous material, which evidently represents a much degenerated embryo. Just proximal to this portion of the tube the lumen has again been cut across; it is here about 1 cm. in diameter, and is almost completely filled by a roughly

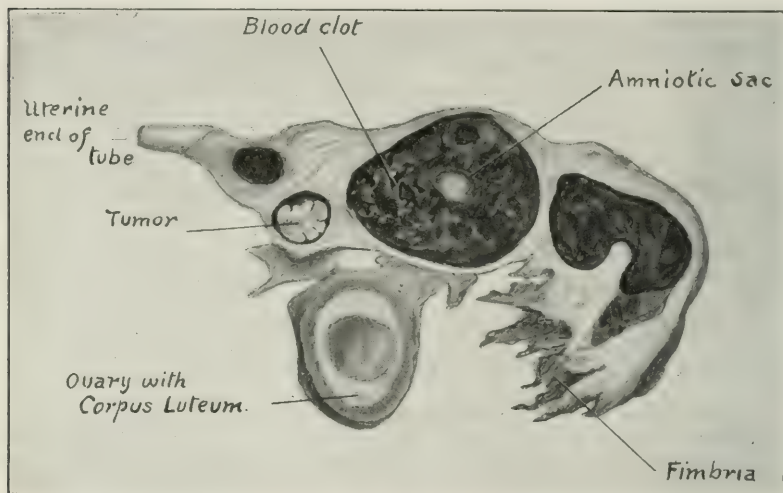


FIG. 1.—Longitudinal section through tube and ovary. The lumen of the tube has been cut by the plane of the section four times; at one of these points the small intra-tubal tumor has been cut through.

spherical mass of soft, somewhat papillary tissue, which on section presents a grayish, fairly homogeneous cut surface. This tissue mass appears to lie quite free within the tube lumen, by which it is completely surrounded. Proximal to this again, the tube rapidly narrows down to about normal size, and presents no gross abnormalities. The ovary, only a portion of which is present in the specimen, consists almost entirely of a large corpus luteum with a somewhat cystic center.

Microscopic sections taken through the outer portions of the tube show intense congestion, edema, and round-cell infiltration of the wall and of the mucous plicæ. The lumen is greatly dilated, and is filled with blood clot, in which are numerous chorionic villi in varying stages of degeneration, many, however, showing a well preserved double-layered epithelium on the surface.

Sections taken through the portion of the tube containing the small tumor present the following conditions (Fig. 2): The lumen

is markedly dilated, and the mucosa is greatly atrophied; the plicæ have almost entirely disappeared, being represented merely by a few stunted projections here and there into the free cavity of the lumen. The latter is almost completely filled by the tumor mass, which consists primarily of a fairly dense connective tissue stroma; this is in many places considerably degenerated, so that its original character is somewhat difficult to determine; for the most part, however, it is fairly well preserved. The most striking feature of this tissue is its great richness in extremely engorged capillary

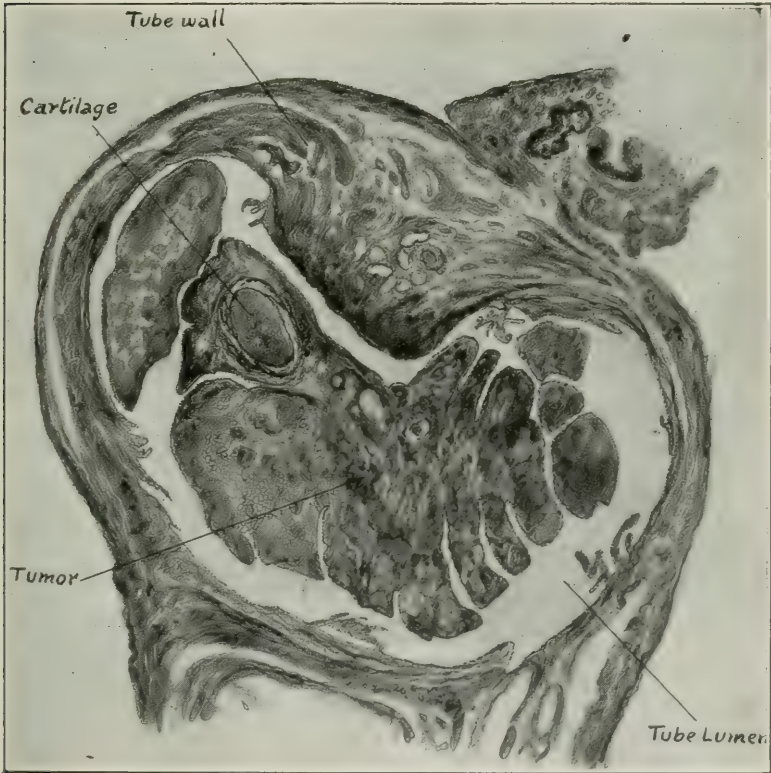


FIG. 2.—Very low power drawing of a somewhat oblique section through the tube and tumor. (The apparently complete separation of some of the lobules of the latter from the main mass is due to the plane of the section.)

blood-vessels, and the extensive amount of interstitial hemorrhage which pervades the entire mass. In some areas, indeed, the stroma is reduced to a mere delicate framework enmeshing quantities of red blood cells. The number of small blood-vessels never reaches such a degree, however, as to suggest an angiomatous condition; there is no evidence of endothelial proliferation, nor is there any dilata-

tion or proliferation of lymph vessels. The picture is distinctly one of extreme passive congestion.

Scattered here and there are small but quite numerous areas of fat tissue. This is apparently of degenerative origin; it lies in little irregular masses between the connective tissue fibers, and does not present the appearance of having formed an integral part of the neoplastic process. Near one edge of the tumor is a small but quite prominent oval area, measuring about 2×1 mm., which even upon macroscopic examination of a section stained with hematoxylin-eosin attracts attention by its intense blue color. Under the



FIG. 3.—High power view of the small island of cartilage in the tumor; showing also the single layer of columnar epithelium covering the surface of the growth.

microscope, this area is seen to be composed of typical hyaline cartilage (Fig. 3), imbedded directly in the fibrous stroma tissue. There is no evidence of calcification or ossification.

The tumor as a whole is given a somewhat lobulated or coarsely papillary structure by the presence of several deep clefts, which extend from the periphery well into the substance of the tissue. Completely covering the surface, and extending down into these clefts, is a single layer of columnar epithelium, exactly similar to that lining the tubal mucosa, but there is nowhere any suggestion of typical plicæ projecting into the lumen from the surface of the tumor.

In none of the sections was a connection between the tumor

and the tube wall demonstrable. Unfortunately the specimen was considerably mutilated during the course of the gross examination, before it was realized that it presented any features of very special interest, and it was therefore not possible to make complete serial sections of the entire growth. Several blocks were imbedded and sectioned, however, and in none of these was the pedicle to be found; moreover, upon macroscopic examination the entire little tumor-mass appeared to lie quite free within the lumen, as does a cork in the neck of a bottle for which it is slightly too small. The presence in the tumor of the numerous engorged blood-vessels is of course evidence, however, that a connection with the tube wall had existed at least up until shortly before extirpation of the specimen from the body. It is probable that this pedicle was extremely delicate; whether it was broken during the operation or subsequent examination, or whether it had spontaneously disappeared, cannot be definitely determined, but the high degree of degeneration in some parts of the growth would seem to indicate the probable correctness of the latter supposition. The possibility of such an occurrence is shown, moreover, by a case reported by Fedoroff, who found upon opening a somewhat dilated sac, comprising the outer portion of an inflamed tube, "about fifteen free bodies, completely filling the cavity of the sac. These varied in size from that of a hemp seed to a small bean. On microscopic examination, these bodies were seen to be identical with *papillomata benigna tubæ Fallopii*, but they had lost all connection with the tubal mucosa." This is the only case that I have found recorded of such an occurrence, but it clearly demonstrates the possibility of the complete separation of an intratubal pedunculated tumor from the surrounding tube wall.

It is evident, therefore, that we are here dealing with a small tumor, primary in the Fallopian tube, consisting chiefly of fibrous tissue, but containing small areas of fatty degeneration, and a very definite mass of cartilage. In all probability it arose from the interstitial tissue of the tube wall, and developed within the free cavity of the lumen as a pedunculated mass. Pure fibromas of the tube are extremely rare, most of these tumors containing a certain admixture of muscular tissue; this may possibly have been present also in the present specimen, although it is not now demonstrable even in sections stained with van Gieson, owing perhaps to the extensive degeneration. With few exceptions, the fibromas or fibromyoma of the tube so far reported have been situated in the substance of the wall, sometimes concentrically or eccentrically surrounding the lumen, or were subserous growths, attached by a pedicle to the external surface. A few pedunculated tumors attached to the fimbria have been described, but the only specimen which was at all similar in situation to the case here reported was one published by Wettergren;

this was a pedunculated, submucous fibromyoma, measuring about 4.5×3 cm., situated just at the tubouterine opening, which it partially occluded. It also was associated with a tubal pregnancy, which the author considered in all probability due to the partial obstruction of the tube by the tumor. The type of growth much more frequently found invading the lumen of the tube, however, is the richly branching *mucous papilloma*, with whose structure the present specimen has nothing in common.

A point of considerable interest is the presence of the small area of cartilage. The occurrence of this tissue in tubal growths has been noted in at least one previous instance, and in a few others a gross appearance suggestive of cartilage was noted, but was not confirmed by microscopic examination. The most definite case is the one reported by Thiébault, who describes a tube "in the ampullar portion of which was to be seen a little tumor the size of a hazel-nut, having an irregular surface, of cartilaginous consistency, and attached to the external surface of the tube. On microscopic examination, this was found to be an enchondroma, composed of cartilaginous tissue containing large and small cells. The central portion was softened, and the outer layers contained areas of calcification."

In the present instance, the question arises, does the presence of the fatty and cartilaginous tissue in the fibrous stroma indicate that the growth is a true "mixed tumor" of embryonic origin, similar to a few cases that have been described in the uterus? As has been said, the fatty elements are inconspicuous, and are apparently the result of degeneration. In view of the presence of but one small area of cartilage, and the absence of any other tissue types, as well as of any evidence of active cell-proliferation, it would appear more rational to assume that the cartilage has arisen as the result of metaplasia of the connective tissue, rather than to consider the whole the product of an embryonic cell-rest. The tumor is essentially a *fibroma*; in view, however, of its form and situation, and of the presence of the cartilaginous area, the term "polypoid chondrofibroma" would appear to be the most satisfactory designation.

With regard to the possible etiologic rôle played by the tumor in causing the tubal nidation of the ovum, it certainly seems highly probable that the little growth, almost plugging the lumen of the tube, but yet in no wise completely obliterating this, might well permit the passage outward of the actively motile spermatozoa, and yet act as an efficient barrier to the inward course of the larger and more passive fertilized ovum. The development of the

latter at a point just distal to the situation of the tumor is quite in accord with this theory.

The occurrence of small intratubal growths in connection with extrauterine pregnancy has been previously noted in a number of instances. Wettergren's case has already been referred to, and other have been reported by Beck, Breslau, Leopold (two cases), and Wyder, all of whom discuss the possibility of the tumor having formed a mechanical hindrance to the entrance of the ovum into the uterus. In Breslau's case, and one of Leopold's, however, implantation of the ovum had occurred at a considerable distance from the tumor, and the etiologic relation appears therefore somewhat doubtful, but in the others the existence of such a relationship seems at least highly probable. In all these cases (with the exception of Wettergren's), however, the growths were merely polyps springing from the tubal mucosa, and were in no sense to be considered true fibromata or fibromyomata. In several of them a distinct decidual reaction was present, and Ahlfeld, indeed, has advanced the contention that these polyps represent merely proliferations of tubal decidua *secondary* to the pregnancy, and are therefore not to be considered a causative factor in the localization of this in the tube. In the case here reported, however, there can be no question of the tumor having arisen as a result of the pregnancy; it contains no decidual elements, and its entire structure shows it to be a primary growth. It is, so far as I have been able to determine from the literature, the only case thus far reported of a submucous, pedunculated fibrous tumor, containing cartilaginous elements, situated within the lumen of the Fallopian tube.

SUMMARY.

(1) In a tube removed on account of an early tubal pregnancy a small, somewhat papillary growth was found practically filling the lumen just proximal to the placental area.

(2) Microscopic examination of the tumor showed this to be a somewhat degenerated fibroma, covered on the surface by tubal epithelium, and containing extensive areas of interstitial hemorrhage, numerous engorged capillary blood-vessels, small areas of fatty degeneration, and an island of hyaline cartilage.

(3) No connection between the tumor and the tube wall was demonstrated, although this undoubtedly had existed in the form of a narrow pedicle.

(4) The growth appears to be essentially a fibroma, with a small area of cartilaginous metaplasia, and not an embryonic mixed tumor.

(5) It seems quite possible that the little tumor, almost blocking

the tube lumen near the uterine end, may have been a factor in the arrest of the ovum, and the consequent development of the tubal pregnancy.

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2040 CHESTNUT ST.

CESAREAN SECTION NECESSITATED BY PELVIC
CHONDROSARCOMA.

BY

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Mrs. F. F., at twenty-two, housewife, was confined by me July 7, 1910. Labor and birth canal normal, child normal. Her husband had been committed to State Hospital for the Insane, suffering with cerebrospinal syphilis some years before her marriage to him; was discharged cured, became a male nurse at the institution and in that capacity met and married the subject of this case history.

I saw the patient in July, 1911. She was pregnant and complained of vague pains down left thigh when she walked. I did not examine her then as I attributed the pains to pressure on the pelvic nerves by the enlarging uterus. October 30, 1911, at midnight, after she had had labor pains for eight hours, I was called in.

Vaginal examination showed the os dilated to the size of a silver quarter, but to reach the os required passing the examining fingers past a growth bulging from the left side of the pelvic wall, there being a space of an inch between its summit and the right lateral vaginal wall. The growth was of the size of a large orange, irregularly rounded, in apparent continuity with the bony pelvis, springing from the rami of pubis and ischium, from symphysis pubis to tuberosity of ischium and absolutely sessile. The pains were regular at five-minute intervals. No superficial lymphatic glands were palpable. I suggested Cesarean section as better than embryotomy. She said she would decide in the morning. I gave her a hypodermic of morphine and when I saw her in the morning she had decided on having a Cesarean section. The morphine had quieted the pains but they were regular and at intervals of between three and five minutes. The os was dilated to the size of a silver dollar. Fetal heart sounds could be detected. Patient had a systolic and diastolic murmur at apex which apparently was well compensated. Pulse 120. Temperature $99 \frac{1}{5}^{\circ}$ F. Dr. L. Brinkmann came up from Philadelphia and with my assistance at her home, did a Cesarean section with a subtotal hysterectomy at 4 P.M. Child was alive and well, but died ten days later from gastroenteritis. The mother made an uneventful recovery. Ten days after operation a Wassermann examination was positive and on December 5, 1911, she got Salvarsan, 0.5 gm. intravenously. This was followed by Hg. inunctions and potassium iodide internally. All this with apparently no effect upon the growth as it increased in size and by August, 1912, was the size of a large grape fruit. Pain down the left thigh and in the knee bothered her a great deal. August 29, 1912, at St. Agnes' Hospital, Philadelphia, Dr. Brinkmann removed the growth through a perineal incision along the left side of the vagina, pulling vulva to right and shelling the growth from its attachment to the pubic and ischial rami with the hand. It extended upward to the sacral promontory and inward over the inner surface of the acetabulum. Its origin from the bone was curetted, an iodoform gauze drain put in, and the wound closed. Recovery complete. Macroscopically, the tumor was solid, irregularly rounded, encapsulated, and lobulated. The capsule contained some blood-vessels. Microscopically, the tissue was typical hyaline cartilage. Patient improved in general health for two months when the growth appeared again and was progressive in its development causing pain by pressure and seeking origin from a more extensive bony attachment. No glandular enlargement could be made out and no evidence of metastases. September 15, 1913, at

St. Agnes' Hospital, Dr. Brinkmann again removed the growth with some difficulty, and as extensively as possible, through the former incision and another incision in the anterior abdominal wall above pubis and extraperitoneally. The growth was now attached to the posterior surface of the symphysis pubis and along the rami of the pubis and ischium to the tuberosity of the ischium and inner surface of ischium over inner surface of acetabulum. Iliac vessels were in contact with it in parts and necessitated some care in its removal. A gauze drain was put in and the wounds closed. There was some venous oozing, otherwise recovery was uninterrupted. Macroscopically, the tumor was the same as the first one; microscopically, however, it is an atypical cartilage; the cells are large, abundant and irregularly disposed.

Adami says that each time these tumors recur, they exhibit stages of a more and more malignant type, the type example being recurrent fibroids of the throat. This specimen shows the same features. Whether to call this a chondrosarcoma from its histological appearance is debatable. Patient now has a recurrence of the growth which exceeds in size all former ones and extends upward to within one inch of the umbilicus, is very irregular on its surface, and is growing anteriorly, bulging the abdominal wall. The inguinal glands are enlarged on both sides. She requires anodynes for pain, is cachectic and confined to her bed, awaiting a speedy dissolution. Combining the history of the case with the appearance of the growth, I think we are justified in calling this a chondrosarcoma or malignant chondroma.

615 WEST MARSHALL STREET.

THE PATHOGENESIS AND DIFFERENTIAL DIAGNOSIS OF PERIRENAL ABSCESS COMPLICATING THE POSTPARTUM PERIOD.

BY

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THE frequency of perirenal abscess occurring during the postpartum period is small and Küster's statistics published some twenty-five years since, show that out of a total of 230 cases, only seven complicated the postpartum. Therefore the part played by puerperal infection is very small in the etiology of perirenal suppurative proc-

esses. Then, again, these statistics, as has been said, date back twenty-five years and since this time the methods of sterilization have been so greatly perfected that the frequency and gravity of puerperal infection have very greatly diminished so that it is probable at the present time the part played by this infection in the etiology of perirenal suppuration has still less importance.

But Küster only took puerperal infection into consideration and did not include pyelonephritis of pregnancy, a process that is now known to be a very important etiological factor in the production of perirenal abscess, thanks to the researches of Albarran, Guiteras and many others, although it must be admitted that it is infrequent. It would also appear that perirenal abscess is far more common on the right than on the left side and the only explanation for this fact is that the right renal gland and perirenal tissues are lower down than on the left, and it consequently is more liable to be injured by pressure from the uterus during the contractions of labor. The left kidney being higher up partially escapes the pressure of the pregnant uterus. Then too, the uterus during pregnancy lies more to the right and this position being quite accentuated at the time of labor can explain the pressure brought to bear on the right renal gland and perirenal tissues in preference to the left.

Two principal factors enter into the pathogenesis of perinephretic abscess postpartum. In the first place we have the trauma of the kidney and perirenal tissues resulting from the efforts of labor, this having as a result the creation of a *locus minoris resistenciæ*, a soil well prepared for the second factor, which is infection, to produce its work.

The part played by trauma as a factor predisposing the tissues to infection is too well known to require any comment here and in perinephretic abscess in general it is frequently noted as the causal factor of the process. In Küster's statistics various forms of contusion and trauma are mentioned as causal factors in 67 out of a total of 230 cases.

The lax cellulose-fatty tissue, poor in vascularization, which composes the perinephretic atmosphere is poorly organized to struggle against infection, and trauma, even of trifling violence, further lessens its vitality, so that it forms a most favorable soil for the growth of pathogenic bacteria which may be brought to it. This condition of affairs is realized at the time of labor, because the muscular efforts of the abdominal press clearly act in a brutal manner on the abdominal viscera. The kidney and its fatty atmosphere are repeatedly and considerably compressed within the abdominal

cavity which is largely occupied by the pregnant uterus, itself the seat of contractions and extreme hardness. The resulting trauma, as can be readily conceived, is really serious and quite capable of profoundly interfering with the nutrition of the elements of the fatty capsule, as well as their vitality. This state of lessened resistance to the bacteria of infection will remain for a number of days after the cessation of the traumatic action, so that the pathogenic elements which were in the soil before the trauma took place, still will find a most favorable culture media in the fatty atmosphere. Whether or not a slow labor, mechanical difficulties or twin pregnancy have any particular bearing on the question is difficult to say, but it would not be illogical to suppose that such conditions might very well have some etiological influence.

The examination of reported cases shows that there are two ways of infection, viz: (1) genital origin, and (2) urinary origin. Infection of the genital tract is frequent during labor, either from digital vaginal examination or the application of the forceps. On the other hand, it may take place during the first days following delivery as the uterine cavity forms a vast raw surface which is an open door to microbic invasion. Few case histories, however, indicate that there was infection postpartum and some patients were up and about when the first symptoms of the perirenal process made their appearance, while examinations made previous to the occurrence of labor revealed no evidence of an inflammatory process in the uropoietic or genital systems. It therefore seems to me plausible to admit that in these particular instances the infection was genital in origin and took place during labor or convalescence and that the infecting organism was carried by the lymphatics to the perirenal tissues. The reason I am of this opinion is because blood infection is frequent after labor and it can be readily conceived that the bacteria may be conveyed by the uteroovarian vessels to the perirenal region, but clinical reasoning forces me to reject this possible manner of microbic invasion. Puerperal infection and perirenal abscess are not processes occurring at the same period; the first is a complication arising during the first few days following labor, while the second is a late postpartum complication. Then, too, the case histories do not show that there was any evidence of genital infection and the physical condition of these patients was good until the appearance of the symptoms of perirenal abscess.

Now, the raw uterine surface following detachment of the placenta is extensive and inoculation with pathogenic bacteria of the intramuscular lymphatic meshes is easy. The infection is trans-

mitted to the lymphatic plexus situated in the broad ligament, more especially at its base. From this plexus starts a group of lymphatic trunks called the upper or ovarian, formed by the lymphatics coming from the ovary, tube and corpus uteri, which follows the uteroovarian and transport the bacteria to the lumbar lymph nodes which are seated just below the renal vessels. At the level of the lower renal pole, the perinephretic capsule formed by the fascia is open and the perirenal fat at this point continues with the retroperitoneal fat. It is by this defect in the perirenal fascia through which the lymphatics of the fatty capsule communicate with the retroperitoneal lymphatics that the transportation of the infection takes place. Quite a number of these lymphatic trunks empty into the lymphnodes that Krymov described in 1907, which he found located in the midst of the perinephretic tissue, some in front of, others in large number behind, the kidney. Therefore, a perirenal abscess in these cases is, pathologically speaking, a lymphatic abscess.

When the etiological factor is a pyelonephritis of pregnancy and there is no rupture of the pus into the perirenal tissue, the infection is carried by the lymphatics through the fibrous capsule of the kidney into the fatty atmosphere. For that matter, this is the path followed ordinarily, as the experiments of Albarran, published in 1889, prove.

Taken all together, the symptoms of perirenal abscess are met with in other pathologic processes, and this may be the cause of a diagnostic error in some cases. This is important because the diagnosis should be made early as all depends upon the promptness with which the trouble is recognized and operation undertaken. The only time when a diagnosis is difficult is in the early stage when pain alone is complained of, because I assume that the reader is familiar with the other symptoms of perirenal abscess which soon appear upon the scene and cannot possibly be mistaken.

Abdominolumbar Neuralgia.—The lumbar pain of perinephretic abscess with radiations, may be mistaken for an abdominolumbar neuralgia.

Diseases of the Hip.—When a perinephretic abscess gives rise to pain in the region of the hip-joint with lameness and muscular contraction, the possibility of some lesion of the hip is often considered. But in perirenal abscess there is no atrophy of the hip muscles, the leg on the diseased side is not shortened and there is neither swelling nor pain on pressure over the trochanter or femur. Passive movements of the hip-joint are painless.

Psoitis.—In other instances the pain shooting along the psoas

muscle produces a characteristic position of flexion of the thigh on the pelvis with slight internal rotation, the position of relaxation of the psoas. Psoitis is naturally thought of, but the lumbar fullness, the absence of tumefaction at the root of the thigh, as well as the indolence at this point, will at once discard this diagnosis. When a perirenal abscess gives rise to secondary foci along the psoas muscle with phenomena of psoitis, then the diagnosis is practically impossible.

Inflammation of the Adnexa and Appendicitis.—A perirenal suppurative process may give rise to the clinical picture of an inflammation of the adnexa or appendix, which are both common after labor. But in salpingitis the pain is seated lower down in the iliac fossa, while vaginal exploration will reveal a tender mass in the vaginal cul-de-sac. By bimanual palpation the enlarged tube can be readily mapped out. In appendicitis the pain is also lower down than in perirenal suppuration and the painful tumor in the iliac fossa is quite enough to reveal the true nature of the affection.

Hepatic Colic.—A lumbar pain with extension might lead one to think of hepatic colic, but the pain over the gall-bladder is wanting in perirenal abscess while it is constant in gall-stones.

General Infections.—When the general phenomena predominate the scene, accompanied by diffuse and vague lumbar pain, a perirenal abscess may be mistaken for some general infection, such as typhoid, influenza or puerperal infection. It is when the patient presents digestive disturbances with a rise in temperature and abdominal distention that typhoid is thought of, but in perirenal abscess there is no diarrhea, headache or prostration and the thermic oscillations are always greater than in typhoid. As in puerperal infection, the temperature is high, the pulse rapid and the general physical condition seriously involved, but in the latter affection the oscillations in the temperature are not so considerable as in perirenal abscess, and then puerperal infection comes on early after labor, usually within five or six days. Perinephretic abscess develops much later.

Renal Infection.—When the patient has presented a pyelonephritis during the pregnancy the diagnosis becomes hesitating. The persistence of the fever with great oscillations and the marked involvement of the general physical state, may naturally lead to the supposition of an aggravation of the preëxisting renal lesion. The appearance of a tumor in the renal region may well lead one to suspect that a pyonephrosis has complicated the renal infection. When the fever is slight and a tumor is found, hard and deep-seated, with a

poor general health and rapid loss of flesh, a malignant renal neoplasm might be diagnosticated by a careless observer.

The signs that will give a clue to the real trouble are the indefinite limits of the tumefaction, deep fluctuation, immobility of the tumor during forced respiratory movements, the absence of renal ballotement by bimanual palpation. These will at once do away with the diagnosis of a renal neoplasm or pyonephrosis. Then, in pyonephrosis there is always a considerable amount of pus in the urine. The pyelonephritis of pregnancy usually improves after labor and is rarely complicated by pyonephrosis.

In conclusion it may be said that in a woman who has recently been delivered, the appearance of persistent pain in the lumbar region, with or without extension, increased by pressure of the renal region, with fever and difficulty in walking and moving the body, should at once lead to the consideration of perirenal abscess. The ultimate appearance of a lumboiliac tumor will make the diagnosis almost one of certainty.

3, RUE BELLOT.

PLEA FOR A MORE UNIFORM USE OF THE MURPHY BUTTON.

BY

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RARELY has man been so gifted as the producer and namesake of this ingenious and safest means of visceral anastomosis.

If I fail to make a worthy point in my discussion of this subject, yet am permitted by this writing to uniformly encourage the entire profession to read every word Dr. Murphy writes, I have done more in literature than is usually my privilege. Few men, if any, have so profited by an exhaustive experience as he. Dr. Murphy's method of logically assembling diagnostic factors and his ability to arrive at definite conclusions from the standpoint of clinical history and physical signs make him a tower of strength in the teaching world. With the button Dr. Murphy has given us a method of visceral anastomosis which has no equal and I feel it will be but a short time until even those operators who are fond of clamp and stitch method of anastomosis will more uniformly resort to the use of the button.

Even in the earliest history of the Murphy button, but two reasonable arguments could be pitted against its adoption, namely, probability of postoperative bowel obstruction and a failure in

mechanical construction. Both of these objections were soon snowed under by reports from numerous operators who obtained uniformly excellent results from its use.

In eleven years experience with the late Joseph Price and in my experience in the Joseph Price Hospital and several other institutions in which I do abdominal surgery, I have never seen the least trouble from its use and I use it practically to the exclusion of all other methods.

The day is here when we cannot afford to have a 1 or 2 per cent. surgical mortality from any human error. Even a 2 per cent. mortality from gastroenterostomy is too high, as I fail to see any reason why we cannot operate with a *nil* mortality in this simple operation. It can be done by a uniform adoption of the Murphy oblong button.

At this writing I have not the exact number of cases in which the button has been used in my experience, but it amounts to several hundred and there has not been a death due in any particular to faulty use of the button or a failure of anastomosis. It has numerous advantages.

The button can be used in one-half the time by an average operator that it would take to perform any other means of anastomosis that has for its principle the clamp and stitch method. This is important, as the average patient upon whom any anastomosis is indicated is a poor subject for surgery and time is of vital importance. On account of the ease of its application it has a use in the hands of numerous operators who are not abdominal surgeons but occasionally have to operate. This is a very valuable and important point to be remembered by teachers of surgery in general. They must teach simple and safe methods in surgery, as their doctrine is adopted by men all over the country districts who are saving thousands of lives and yet do not have time to perfect complicated technics. We in the large educational centers must take care of these men and this is my most strenuous objection to the complicated technic which is too often seen. If the button is the safest method in the hands of the occasional operator, it is more safe in the hands of the expert. Any anastomosis made by button is a connection produced by a slough and is not prone to closure by subsequent contraction. This is one of its strongest features and a most appealing factor for its use.

We learn in gynecology we can incise the bladder without any fear of a permanent fistula, but that fistula produced by slough such as the early obstetricians often saw from permitting the nonreceding

head to remain too long in pressure upon pelvic structures produced a fistula from pressure necrosis which did not heal without subsequent surgery. The same principle applies to the use of the Murphy button.

The stitch and clamp method which necessitates a long incision to allow for future contraction is not even as large an opening as one would think from the length of incision. Do the operation and then pass the finger through the anastomosis; you will find from a 2 1/2- to a 3-inch incision you have little more of an opening than you get from the round medium size button and not as much of an opening as you get with the oblong button. The double row of sutures used in clamp and stitch method produce a broad projecting ring into the anastomotic opening which is a partial mechanical obstruction. The point of external resistance is the peripheral ring of attachment between the opposing visceral serous surfaces; therefore, the greater the distance between the two rows of sutures in the clamp method, the more extensive the internal protruding ring and the broader the ring of opposing surfaces the greater amount of fibrous tissue and thus the greater degree of subsequent contraction. The breadth of the ring of visceral anastomosis incident to the use of the Murphy button is inconsiderable and has no protruding ridge for mechanical obstruction.

If you compare the size of an opening made by the Murphy button to that from the usually large incision by clamp and stitch method, you will find an anastomosis from clamp and stitch method three times the diameter of the Murphy button will not give as much of a final opening as the button.

The excess amount of traumatism done in the stitch method is by far a greater cause of harmful adhesions than that due to application of the button. These adhesions are often the source of mechanical trouble through pressure, fixation or distortion of the anastomosis.

The total absence of hemorrhage following use of the button is a convincing argument for its more uniform adoption and makes it the ideal anastomosis from this standpoint. Its hemostasis is due to the principle of the clamp which we all know is the ideal method of controlling hemorrhage. I use exclusively the clamp for all vaginal hysterectomies and during my early years of apprenticeship with Dr. Price we used the *serre-nœud* for hysterectomies. I use the clamp for controlling hemorrhage in nephrectomies and understand Dr. Murphy has devised a special clamp for this purpose. I have never seen a hemorrhage follow the clamp method in my work covering many hundred hysterectomies.

The mortality from gastroenterostomy due to hemorrhage is much higher than statistics will ever show. It causes a greater mortality than any other individual complication, except pneumonia. Much of the work of men who are active operators is never published.

Stitch necrosis following gastroenterostomy by clamp method is a common complication and a source of fatal error. Even the most expert operators have such complication and as I said in the beginning of my discussion, one in one hundred is too high in these days of privileged surgery. Remember that all anastomosis by clamp and suture method is a collapsing buttonhole of a predominating diameter. That from the button is a circular opening such as we would get from a hollow cylinder punch and is better for all drainage or exit purposes. An embarrassing number of incidents of sloughing due to pressure from applications of the forceps have occurred. This is a stern objection and will constantly occur in the hands of the occasional operator and too often has occurred in the hands of the expert. The forceps pressure from traumatism to vessels is a factor through thrombosis in causation of stitch necrosis and faulty union at anastomotic points.

The button can be used in locations where clamp and stitch are impossible from difficult application. Either half of the button can be dropped into the intestine at an accessible point through small incision or open end of the bowel, then passed along inside of the intestine to the more remote and inaccessible point of intended anastomosis. Then we make a slight nick over the cylinder through the bowel wall, the intestine is milked or pushed over the cylinder and an anastomosis made even more quickly than we can tell it.

All lateral anastomoses can be made by this method in a few seconds and the early date at which the button will pass is the strongest plea for the perfect anastomosis. I have had a button pass from a lateral anastomosis between ascending and descending colons in a patient eighty-four years old, at the beginning of the fourth day. This is due to the fact that when the intestine is simply nicked over the cylinder of the button and pushed back over the axis, the mucous membrane of the intestine has no chance to pucker or evert between the opposing surfaces of the bowel. The apposition is perfect and results always excellent. The more perfect the apposition the less fibrous tissue and therefore the less future contraction. If you are sidetracking malignancy, make a small incision in the discarded portion of bowel, drop in the respective ends of button, close incision in bowel, push the halves of the button to point of required anastomosis and make the anastomosis as above described by nicking the bowel

over the cylinder of button. I would advise operators who are not in the abdomen every day to adopt this method of anastomosis as they will have fewer failures than if they attempt the end-to-end union with the puckering string to take care of the everting membrane. The end-to-end anastomosis is of course the ideal method of intestinal union and is easy and safe in the hands of abdominal surgeons. It has always been a wonder to me that the button has not been uniformly adopted in all cases where the stomach has been resected for malignancy. During the resection one-half of the button could be dropped into the open end of the stomach and the anastomosis made with the intestine in one-fifth the time that it could be done by stitch and clamp method. I have seen three operative deaths which I am positive could have been averted had the above method of anastomosis been adopted. It seems to me in extensive resections of the stomach no other means of anastomosis should be attempted. In practically all gastroenterostomies in which we have little liberty with the stomach, you will get better results if you make an opening in the anterior wall of the stomach at an easy point of entrance, drop in one-half of the button, close the opening, turn the stomach up, nick the mesocolon, buttonhole on cylinder of the button and make the posterior anastomosis. The intestinal side of the anastomosis can be done likewise. The objection that an extra opening has been made into the stomach is only argumentative and theoretical. It is more difficult to deal with the thick wall of the stomach by a puckering string around the axis of the button. There is certainly less liability to hemorrhage when the axis of the button is pushed through a small nick in the stomach wall and the button passes several days earlier.

I always stitch the rent in the mesocolon to the stomach side of the anastomosis and use no fortifying stitch around the anastomosis. I have not found it necessary to use the oblong button in gastroenterostomy, using entirely the medium-sized round button. The perfect apposition by this method is followed by little if any contraction. Until I have some from the use of the round button, I shall continue its use.

Although I do almost exclusively the posterior operation, I do not feel the last word has been said about the anterior method of gastroenterostomy. The posterior method seems to be the anatomical conclusion, yet the opening is not as physiologically placed as the anterior operation which is done at a point nearer the natural exit of the stomach. Here the button has another advantage, in that the posterior operation can be done by the method described above at a

point much nearer the pylorus than is possible by clamp and stitch method. I am sure the late results of gastroenterostomy done by the button nearer the pylorus will give the best permanent results.

I desire to thank Dr. Murphy for this ingenious surgical device.

241 NORTH EIGHTEENTH STREET.

THE APPLICATION OF THE NINHYDRIN REACTION TO THE URINES AND URINE DIALYSATES OF PREGNANT WOMEN.*

BY

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IN 1912 Abderhalden stated that he had discovered a test for pregnancy based upon the fact that in the blood serum of pregnant animals there exists a specific enzyme which can split placental protein into dialyzable substances. By dialyzing out these substances from such blood serum after placental protein has been added to it, and by using a very delicate reagent, ninhydrin or triketo-hydrinhydrate, to test for them, he claimed that he had found a definite and trustworthy means of demonstrating the presence or absence of this enzyme in the blood serum. The difficulties of the technique of this test, however, have been so great that very different and contradictory results have been obtained by various observers. An explanation for this has been offered. The necessity of obtaining the blood aseptically and keeping it aseptic and uncontaminated, the variability of the activity of the enzyme—for, as is well known, the activity of enzymes varies greatly with time, temperature and different environmental factors, their action being inhibited or accelerated by numerous agents, the complexity and instability of composition of the serum—all these have undoubtedly contributed no little to the unsatisfactory results obtained. Consequently, it may be said that the hope of employing this test in obstetrical practical work has largely been given up.

So when in the February 7th number of the *Journal of the American Medical Association*, of this year, Dr. Louis M. Warfield published a report that he had found a way of applying the ninhydrin reaction to the urine of pregnant women, he aroused a very great interest in his work. For Dr. Warfield argued very plausibly that “. . . if there was a specific ferment in the blood serum which was elaborated to split up the products derived from the placenta, syncytium espe-

* From the Pathological Department of the Sloane Hospital for Women.

cially, there should be also in the blood waste, products of the metabolic activity of the growing fetus. These substances had to leave the body by some route and the most logical route was the urinary excretion. These products should be peptones and amino-acids, they should dialyze out and one should then be able to find them by means of the ninhydrin reaction in the dialysate. It was found that actually such was the case." And if such were actually the case, it would be a matter of the first importance, for not only would it greatly simplify the technique of the Abderhalden test, but by eliminating the necessity of testing for an enzyme and by testing for the split products themselves it would make possible a wide and general employment of the test by the general practitioner.

Now there is a fallacy in this reasoning. For if "there should also be in the blood, waste products of the metabolic activity of the fetus" then how was it that, according to Abderhalden at least, the dialysates of the controls in his experiments, that is the dialysates of blood serums of pregnant women to which placental protein has not been added, did *not* react to ninhydrin. If such dialyzable peptones and amino-acids are present in the blood stream of pregnant women, as Warfield postulated, why do not these peptones and amino-acids dialyze out from the blood serum of these controls? Indeed, if this postulate were justified, the entire principle of Abderhalden's test would be vitiated.

However, since Warfield supported his theory by his findings in seventeen cases of pregnancy and seven cases in the puerperium, it seemed worth while to try his test. He stated that of his seventeen cases of pregnancy, only the dialysate of one, a two months pregnancy, did not contain ninhydrin-reacting substances, while all the others, varying from four to nine months, gave a positive reaction, and that, on the other hand, of the seven cases tested in the puerperium one showed a negative reaction on the 11th day, three on the 16th day and one on the 27th day, although one still gave a positive reaction on the 17th day. He also stated that he had put forth his preliminary report as a suggestive lead for large obstetrical clinics to follow, and the writer who for a long time has been interested in the ninhydrin reaction decided to repeat his work on a large number of urines from various sources.

From February 10, to May 15, ninety-seven urines of pregnant women, forty-eight urines of gynecological cases none of whom were pregnant, and ten urines of men, were tested in the following way:

(a) A $\frac{1}{5}$ per cent. solution of ninhydrin in water was used. Two c.c. of the urine and 0.2 c.c. of this reagent were boiled. A

reddish-blue or blue color was considered a positive reaction. The results were: of the ninety-seven obstetrical cases ninety were positive, of the forty-eight gynecological cases forty-three were positive, and of the ten urines of men, seven were positive. Thus 92 per cent. of the obstetrical cases, 89 per cent. of the gynecological cases and 70 per cent. of the urines of normal men, in other words, about the same proportion of pregnant women, non-pregnant women and normal men gave a positive reaction when their urine was tested directly with the ninhydrin solution.

(b) After being tested in this way the urines were placed immediately in collodion bags, made in the usual way, and tested in the previous twenty-four hours for their permeability to peptone and impermeability to colloids, and dialyzed against distilled water. The dialysates were then tested after twenty-four hours in the same way as the undialyzed urines. It was found that all those which had given a positive reaction before dialysis, gave a positive reaction in the dialysates, while those which had given a negative reaction before dialysis gave a negative reaction in the dialysates, that is, that ninety out of the ninety-seven urines of positively pregnant women, forty-three out of forty-eight gynecological cases, none of which showed any symptoms or signs of pregnancy, and seven out of the ten urines of normal men gave a positive reaction. Control tests made with collodion bags and normal salt solution were negative.

None of these urines contained sugar or albumin, as all were selected as carefully as possible to avoid all possibilities of error. The reaction of these urines varied from weakly acid to weakly alkaline, the great majority being weakly acid to litmus paper.

Conclusions.—1. The dialysates of the urines of pregnant women very often react positively to ninhydrin, sometimes negatively.

2. The dialysates of the urines of non-pregnant women very often react positively to ninhydrin and sometimes negatively.

3. The dialysates of the urines of normal men very often react positively to ninhydrin and sometimes negatively.

4. The reaction to ninhydrin of the dialysates of the urines of women cannot be relied upon as a test for pregnancy.

It should be mentioned that the report of Chaillé Jamison, published in the *Journal of the American Medical Association*, April 4, 1914, on the urines of six pregnant women, four non-pregnant women and six men bears out our conclusions.

TRANSACTIONS OF THE NEW YORK ACADEMY OF MEDICINE.*

SECTION ON OBSTETRICS AND GYNECOLOGY.

Stated Meeting, Held April 21, 1914.

ASA B. DAVIS, M. D., *in the Chair.*

ADHESIONS OF THE SIGMOID FLEXURE OF THE COLON: WITH REPORT OF THREE CASES.

DR. JAMES N. WEST.—The three cases reported present very different pathological conditions, but they had one feature in common which causes me to think of them in a group. This feature was adhesions of the sigmoid which were incidentally released, and which in being released gave relief from the most prominent symptoms.

Adhesions of the sigmoid flexure of the colon are one of the most frequent complications of pelvic inflammatory disease. Even where no such inflammatory processes have existed, a long and much curved sigmoid sometimes produces a condition which greatly impedes the fecal evacuation, as is proved by the relief of constipation sometimes secured by the operation of sigmoidopexy.

The first case was that of a woman, thirty-three years of age, never pregnant, who was operated on for an ovarian tumor on the left side. The cyst appeared to be parovarian, in that it was well buried in the layers of the broad ligament. It was about the size of a grapefruit and gave no evidence of being papillomatous. During the operation I observed and called attention to several minute whitish spots on the peritoneum of the broad ligament, the intestines, and the uterus. There were four or five such bodies, hard, white, and not larger than a pin head. After operation the patient did not do well, became emaciated, ran a moderate, irregular temperature, and seemed to be rapidly losing ground. Her physician, Dr. Tracy of South Norwalk, Conn., observed a tumor of considerable size in the left lower quadrant. He feared that a foreign body had been left in the abdomen, but recalling the small white bodies seen at the time of the operation, I made a diagnosis of carcinoma and partial intestinal obstruction, and advised operation. A little over a month after the first operation the abdomen was opened again. A general carcinosis of the lower part of the abdomen was present. A large mass involved the omentum, and a band, apparently of organized

* Program contributed by the Staff of the N. Y. Post-Graduate Medical School & Hospital.

plastic tissue, passed from one carcinomatous mass to another across the sigmoid flexure at about its middle, almost occluding it. The gut formed a good sized tumor filled with gas above it. This was the movable tumor of varying size that had been felt. A portion of the carcinomatous omentum was removed and the band across the sigmoid was thoroughly dissected away. The gas immediately disseminated, and the gut above the band came down to nearly normal size during the operation.

The patient began to improve and to gain in weight, the function of the bowels became normal, and she soon left the hospital. Dr. Tracy, thinking the tumor might possibly be syphilitic, began the use of potassium iodide. This she tolerated in large doses and did well and looked well for several months. She remained in fair condition for six months and then began to fail rapidly and to show signs of intestinal obstruction. An examination convinced me that no further operation was advisable. She passed from Dr. Tracy's hands, was operated upon, and died within a few days. The chief features of interest in this case were:

1. The rapid development of carcinoma from a few, almost microscopic foci.
2. That the chief early symptoms come from a band across the sigmoid flexure.
3. Rapid improvement after the removal of the obstructive band, notwithstanding the coincident development of the carcinoma.
4. The presence in the region of obstruction of a movable and varying tumor.

The second case was that of a woman twenty-six years of age, who was married at the age of nineteen and had one pregnancy in which abortion was induced at two months. Four months before marriage she had been operated on for appendicitis, and nineteen days later had a large abscess open through the appendicitis incision. Two months after marriage she began to have a vaginal discharge and pain in the left side. In September, 1908, she had the left ovary removed on account of a cyst. In the fall of 1909, she had a curettage and a lipoma removed from the right breast. In June of the same year she had had the right ovary removed for abscess and in October, 1909, she had an operation for intestinal adhesions. In the spring of 1910 a hysterectomy was done and the adhesions broken up and in October of the same year another operation for adhesions. In October, 1913, she appeared in my office complaining of pain in the left side of the pelvis, severe constipation, headaches, sleeplessness and extreme nervousness. The pain extended down the left leg to the knee and was worse on exercising. A mass the size of a small orange could be distinctly felt in the left side of the pelvis, and a swelling could be observed in the iliac region, evidently gas in the colon. A diagnosis was made of intraligamentary cyst of the left side and intestinal adhesions. At operation extensive adhesions of the omentum and intestines were encountered and were with difficulty separated. The sigmoid flexure was located and found to be somewhat twisted on itself and firmly adherent to the anterior

brim of the peivis and abdominal wall. With considerable difficulty and tearing the intestine in two places to the mucosa, it was freed, repaired, and the new surface covered with peritoneum as far as possible, using the epiploic process. A cyst was dissected out of the left broad ligament, which had the appearance of a parovarian cyst.

The patient was discharged in two weeks in good condition. On the third day after reaching home she was taken with pain in the stomach and passed through a rather severe attack of illness which was diagnosed by her physician as gastric ulcer. She recovered and has been at her duties and feeling well until the present time. On April 6 it was found that she had a mass on the left side about the size of a hen's egg and impinging on the vaginal vault.

The chief feature of interest in this case was the marked relief from pain and the resumption of normal function of the bowel after the release of the sigmoid adhesions.

The third case, a woman twenty-five years of age, entered my service at the Post-Graduate Hospital from a sanitarium for nervous diseases, November 16, 1913. The patient was regarded as a neurasthenic and had almost become a drug habituè. She complained of pain in the left lower quadrant which had been present for five years. She was subject to attacks of rapid convulsive movements of the abdominal muscles and diaphragm, which would continue until a drug was administered. The bowels were very constipated and a phantom tumor occasionally appeared in the lower part of the abdomen. The woman had had eight operations, removal of the right tube and ovary and appendix at the age of seventeen years; vaginal operations, fixation of the right kidney, and curetings. A diagnosis of salpingo-oöphoritis and intestinal adhesions was made.

At operation on November 17, 1913, intestinal adhesions were freed and the sigmoid flexure observed with a band across its lower part, almost obstructing it. The intestine was much dilated above and greatly atrophied under and below the band, which extended from the diseased tube. The band was thoroughly dissected away, the uterus and remaining adnexa removed, and all raw surfaces covered with peritoneum. Recovery was uneventful, the bowel regained its function, and the peculiar convulsive attacks ceased. The chief points of interest in this case were:

1. The patient had been regarded as a neurasthenic, and had been repeatedly told that her pain was imaginary and the convulsive attacks hysterical.

2. There was a phantom tumor present at times, and the pain always proceeded from that point.

3. Uncertainty of the diagnosis, and relief following operation.

DR. IRA B. TERRY reported a case of

AMENORRHEA PRIMITIVA.

He said: This patient, a woman twenty-seven years of age, came into Dr. West's clinic at the Post-Graduate Hospital, November 13, 1913. She was born in the northern part of Italy and had been

in the United States four years. Her family history was good. She had one sister, who was well, married and had three children. The patient was well nourished, slightly anemic and came to the clinic to find out why she had never menstruated and never became pregnant, as she had been married seven years. She gave a history of a severe fright at the age of twelve years and dates all her trouble from that time. Several doctors in Italy had told her that probably after she was married she would menstruate regularly. She gave a history of pain in the left iliac region which came on once a month regularly and lasted two or three days; this would come on regularly for five or six months and then she would be free from it for the same length of time.

The vaginal examination showed a cervix slightly larger than normal and hard. The uterus was small, firm and regular. The ovary on the left side was larger than normal, about the size of an English walnut and a distinct corpus luteum could be felt on it. The other ovary was not freely movable and the tubes were palpable. The patient had had no vicarious menstruation. The Wassermann was negative. The patient was treated by giving her ovarian extract and calcium lactate and also small doses of thyroid, but with no effect. Then she was given extract of corpus luteum of pregnant cows, with suprarenal extract and lastly an ampoule of the extract of pituitary body twice a week. When I started the first two the patient had severe cramp-like pains in the lower part of the abdomen typical of a dysmenorrhea and had to stay in bed for three days. She was given ergo-apiol capsules to relieve the pain. Each month just as it was time for her to have these pains the left ovary would be as large as a hen's egg, then about the middle of the month it would be down again to the size of an English walnut. It is possible that there is an obliteration of the uterine venous plexus in this case.

DISCUSSION.

DR. JAMES N. WEST.—I should like to ask Dr. Terry if he has had any experience with the use of animal extracts in these cases of amenorrhea primitiva. I have used them in several cases. I have used the corpus luteum of the cow and believe that I got good results for the patient appeared to menstruate better than before its use. I do not know whether it was incidental or the result of the administration of the secretion.

DR. HERMAN J. BOLDT.—In the experience that I have had with the animal extracts, I have received no benefit at all. I have used the Parke, Davis extract of the anterior lobe of the pituitary body in cases of amenorrhea primitiva but the results were negative. I have had a number of these cases but can report no good results.

DR. GEO. GRAY WARD, JR., presented a patient demonstrating the

RESULT OF GOFFE'S OPERATION FOR COMPLETE PROLAPSE.

The patient I present to you to-night is Mrs. M. D., thirty-four and a half years of age. She had a complete prolapse; for two years

prior to the time I operated upon her the uterus and both vaginal walls were hanging outside the vulva, and the exposed parts became very much chafed and sore. I operated upon her on October 4, 1911 (two years and seven months ago). She made a good recovery. She had been married thirteen years and widowed four years. She had had three labors, twins once. The prolapse came on gradually. I present her to show what result can be obtained in these difficult cases.

I should like to have the Chairman appoint a Committee of three to examine the patient and report on her present condition. I did the Goffe operation, with which you are all familiar, and I should like to have Dr. Goffe appointed on this Committee if the Chairman sees fit to do so.

(Dr. Davis appointed on this Committee Dr. Goffe, Dr. Boldt, and Dr. West.)

DR. J. RIDDLE GOFFE.—I doubt if any one could realize without seeing her the condition presented by this woman now, after Dr. Ward's description of the condition which she presented when he first saw her. Now the levator ani muscles are very firmly united, and the support to the pelvic floor is simply perfect. The vagina is rather small in size but not too small. In examining the patient I detected a broad firm band of tissue passing across the pelvis, evidently the broad ligaments which were sewn together in the median line. The result accomplished is perfect. The comforting thought is that while these extreme procidentias have been the *bête noir* of the profession for years we now have an operation which will stand the test of time. I wish to congratulate Dr. Ward on the beautiful results he has obtained in this particular case.

DR. HERMAN J. BOLDT.—I am in accord with what Dr. Goffe has said regarding the result of this operation for complete prolapse. I cannot imagine it possible for anyone to get a better result than what we have found in the examination of Dr. Ward's patient.

DR. JAMES N. WEST.—I have just examined Dr. Ward's patient and can confirm all he said regarding the results of the Goffe operation for complete prolapse. I do not think that the patient will be troubled with either a rectocele or cystocele. I have always felt some hesitancy in doing an hysterectomy in a patient of thirty-four years or thereabouts; in these younger women we should attempt to conserve the organs and cure them. But I would not hesitate to remove the uterus in such a case as presented by Dr. Ward. One could not ask for better results by the Goffe operation as shown in the case of Dr. Ward.

DR. GEORGE GRAY WARD, JR.—The question of what is the best operation in cases of complete prolapse is always before us. Recently, while in Rochester, Minn., I saw the Mayos operate for complete prolapse, and they did a combination of the Goffe operation and the Watkins-Dührssen. They first removed the uterus and sutured the broad ligaments together as Goffe does, and then they interposed the broad ligament between the bladder and the vagina, anteverting the broad ligament and placing the bladder on top of it.

I have tried this operation recently but I do not yet know what the ultimate result will be. This certainly is a promising operation and worth a thorough trial.

REPORT OF A CASE OF VESICO-VAGINAL FISTULA WITH UNUSUAL PHOSPHATIC DEPOSIT.

DR. GEO. GRAY WARD, JR.—The patient was forty-four years of age and has had a very stormy history. Nine years ago, when she was thirty-five years of age, she was delivered of a child after a very difficult labor. She had a rigid cervix and the labor was prolonged and very tedious. I used the Tarnier forceps, which I seldom use now. In this particular case the forceps slipped at one part of the operation, and resulted in a vesico-vaginal fistula. The fistula resulted from the thumbscrew which locks the blades jamming against the symphysis, bruising the part sufficiently to cause it to slough out. The fistula was repaired shortly after the labor and with apparently a perfect result. No trouble resulted until recently. Upon examining the patient I found a mass encysted in the anterior vaginal wall; this was about the size of a cherry and was undoubtedly made up of phosphatic deposit from the urine. It did not seem to cause her any trouble. I expected to find a leak later. On March 28, 1914, I operated upon her because she did develop a leak in the anterior wall beneath the phosphatic deposit. I made a longitudinal incision of the vaginal wall and dissected it freely from the base of the bladder and thus removed the deposit with its sac. The opening into the bladder was very minute, so small that I could hardly pass a bristle through. There was a small opening in the vaginal wall into the encysted deposit. The cystoscope had previously revealed the opening in the trigone. The bladder and vagina were sutured separately and the patient made a complete recovery.

Presentation of patient operated upon for

CARCINOMA OF THE CERVIX BY THE WERTHEIM METHOD WITH A RESECTION OF THE BASE OF THE BLADDER.

DR. GEORGE GRAY WARD, JR.—The history of the patient is of unusual interest because of the difficulties encountered. This patient was operated on October 22 last at the Post-Graduate Hospital. She is forty-two years of age. She has had seventeen children, her last one, a stillbirth, ten months ago. Since this time she has been bleeding profusely and has had a very foul discharge. She had been perfectly healthy up to this time. For ten months after the stillbirth she had bleeding which varied in quantity, and she was unable to attend to her work. She also had backache, pain in the lower abdomen, a feeling of weight in the pelvis and other symptoms. I operated upon her October 29, 1913. I did the typical Wertheim operation with the technic used in Burum's Clinic. She was a very stout woman and this was not an easy case. The enuclea-

tion was satisfactory so far as the uterus was concerned, but when dissecting the bladder from the anterior wall of the cervix I found the growth had eaten into the bladder, and there were two or three small openings made by the carcinomatous tissue perforating into the bladder. This seemed like a hopeless case. I completed operation and was able to remove a good part of the vagina and parametric tissue. Then the question arose, how to deal with the diseased bladder. Dr. Heyd, who assisted me in the operation, encouraged me to go ahead and, we did a suprapubic cystotomy, finding the growth perforating the trigone. A section of the bladder was removed nearly the size of a twenty-five cent piece. An elliptical incision was made for this removal. The drainage employed was that usual for the operation of suprapubic cystotomy. For six months she has never leaked one drop from the bladder, she has not lost weight and feels fine. Recently there was some bleeding on coitus and on careful examination I found the scar in the vagina containing a small polypoid mass, as large as the end of the little finger, but it was soft and bled to the touch. This was removed and the base cauterized and sent to the pathologist for examination and report. He found no evidences of malignancy. The case, however, will be carefully watched. This involvement of the bladder is of special interest, showing, as this did, just what some cases will do in the way of healing without fistulas. After six months this woman feels perfectly well.

Dr. Higgins of the Sydenham Laboratories reports as follows on the small polyp:

"Examination of tissue from vaginal scar. A soft, dark red nodule about $1/2$ inch by $1/4$ inch. Microscopical examination. On the outer border there is a layer of exudate partly organized with many small fine capillary vessels beneath which is a loose fibrous structure impregnated with polynuclear leukocytes and plasma cells. It is well supplied with small blood-vessels distended with red-blood cells and in one place there is a relatively large hemorrhage. In a few places there is a beginning necrosis.

"*Diagnosis.*—Vascular fibrous polyp with secondary simple chronic inflammation."

SPECIMEN OBTAINED BY WERTHEIM'S OPERATION FOR CARCINOMA OF CERVIX.

DR. GEO. GRAY WARD, JR.—This specimen of carcinomatous uterus was removed by the Wertheim operation about six weeks ago. The patient is forty-seven years of age, a widow, and has had four or five children. She is very cachectic. Her symptoms have progressed for one year. The great difficulty in her case was her marked anemia; her hemoglobin percentage was twenty-six when she was operated upon. I was able to remove about one-half of her vagina as well as the parametric tissue as shown in the specimen presented. An interesting point in this case is that as she was still low in her hemoglobin, 46 per cent., we were able to give her a boost

by the transfusion of blood from a very vigorous son. Dr. Edward W. Peterson did the transfusion by the Lindeman method with the result that the patient felt much stronger even the day following the transfusion. This is a recent case but it is interesting because of the marked degree of anemia complicating it, and I thought it would be a case well worth presenting.

SQUAMOUS-CELLED CARCINOMA, PELVIC GLANDS SHOWING TUBERCLE INVOLVEMENT.

DR. GEO. GRAY WARD, JR.—I have here another specimen showing the results of the Wertheim operation which I did last December. The patient was thirty-eight years of age; she has had three children, the last three years ago. She had menorrhagia for about a year and had lost about 10 pounds in weight. The parametric tissue and the amount of vagina removed is shown in the specimen. There is no sign of recurrence at the present time, four months after the operation. The pathologist reported that the pelvic glands removed with this specimen were tuberculous.

DISCUSSION.

DR. J. RIDDLE GOFFE.—I think that Dr. Ward was very fortunate in obtaining such good results in his case of carcinoma. But in the second case he reported in which there was such a low percentage of hemoglobin he is especially to be congratulated. This brings to my mind a case seen at the Woman's Hospital in my service two years ago this spring. She was brought in on a mattress; her bleeding had been terrible and had continued for weeks and she herself said, "I do not expect to live." She was tamponed but the flow came right through. I found the uterus large and I made a diagnosis of some fibroid condition, probably submucous fibroid. I had her taken into the treatment room, made a short incision through the vaginal wall on either side of the cervix, and applied compression forceps, catching the uterine arteries; this caused a cessation of the hemorrhage. In twenty-four hours I removed the forceps and after one month I did a vaginal hysterectomy. On opening the uterus the interior was found full of irregular stalactite protrusions into the cavity of the uterus. Later laboratory examination showed this to be carcinoma (epithelioma). I did not do the extreme operation. The woman picked up rapidly and went home. She came to my office in October, looking fine, strong and healthy. The examination then done showed the pelvis filled with carcinomatous recurrences. I gave the family and friends no hope at all.

DR. CHARLES G. HEYD.—In this case it was a comparatively easy matter to do the bladder operation if one had recourse to a distinct bladder technic. The Wertheim operation was abandoned for the time being and the bladder opened suprapubically in the space of Retzius. A wide excision *en masse* was made and the vesical

defect closed after an ordinary suture method with number two chromic catgut. Drainage was established by means of an independent stab wound anterior to the suture line. The reposition of the peritoneum over the posterior surface of the bladder adequately prevented leaking and the postoperative course was uneventful. The case shows how readily vesical carcinoma may be attacked, and the high reparative power of the bladder in the face of a marked carcinomatous invasion.

EXTERNAL RUPTURE OF BROAD LIGAMENT HEMATOMA.

DR. THOMAS A. CHERRY.—This case occurred in the outdoor obstetrical service of the Post-Graduate Hospital. The patient was thirty-eight years of age, para-xi. She had had one miscarriage and two stillbirths at term from malpresentation of the fetus and operative delivery. She was obese with large, relaxed, pendulous abdomen. The pelvic measurements were interspinous, 26 cm.; intercristal 29 cm.; right oblique, 23 cm.; left oblique, 23.50 cm.; external conjugate, 22 cm.; promontory not felt. The outlet was roomy. The position L.O.A. Labor began on February 28 at 7 A. M. The first stage was normal, lasting thirteen hours. The second stage began at 8.30 P. M. with rupture of the membranes and fairly strong "bearing down" pains, which gradually subsided in force and frequency. The cervix was completely dilate and 2 c.c. of pituitary extract (Armour's) was injected intramuscularly in two doses at five-minute intervals. They had no apparent effect on the pain. The fetus was large and, being over term, after waiting two hours it was thought that forceps delivery was indicated. The patient was prepared and placed in the lithotomy position. The solid blade forceps were first tried but the second blade could not be rotated opposite the first or posterior blade. Traction was made in the oblique application with slipping of the blades. A change was then made to the axis traction instrument. The same difficulty in application was encountered, so traction was made with the blades in the oblique application. As the head appeared on the perineum and when further traction was exerted to deliver it a gush of dark clotted blood was propelled with great force from the introitus. After this apparent rupture of some structure the head was easily delivered over the perineum. The child was moderately asphyxiated but cried on spanking. There was, however, a right-sided facial paralysis. The child weighed 10 pounds, 4 ounces. On seeking the origin of the hemorrhage a vertical laceration about 3 cm. in length was found at the upper angle of the anterior and left vaginal walls and labium minus, close to the pubic ramus, from which a slight oozing of blood was seen. On exploration the rupture was found to lead into the cellular tissue outside the vaginal wall and into a cavity extending upward alongside the cervix and lower uterine segment and base of the left broad ligament about 12 cm. from the vulva. On further examination the finger came into contact below with the posterior surface of the pubis and anteriorly in the median

line with the neck of the bladder. The uterus and bladder were found intact. The patient being in considerable shock, the cavity was packed with 8 yards of 1 1/2 inch iodoform gauze with cessation of the bloody oozing. Efforts were made to combat the shock and the following morning the pulse was 100 and the temperature 99° F. The packing was partly removed on the third day and completely on the fifth. The cavity gradually filled in and was completely healed on the twelfth day postpartum. The child developed stupor and refused to nurse on the third day. Spasms of the lips and eyelid and later nystagmus developed and death followed on the fifth day, apparently from meningeal hemorrhage. The unusual condition of the mother was evidently an unrecognized pelvic hematoma formed during the first stage of labor in the cellular tissue at the base of the broad ligament, subperitoneally and above the pelvic fascia. The collection of blood estimated at 4 1/2 or 5 ounces, was not sufficient to cause an acute anemia, but large enough to prevent the advance of the head with normal uterine contractions and to prevent the proper application of the blades of the forceps. As forcible traction was exerted the head was forced downward, dissecting its way through the cellular tissue, and reaching the pubic ramus was deflected laterally until arrested by the hematoma which was forced toward the median line and there arrested by the anterior ligaments of the bladder. The strong fascia of the levator ani muscle prevented it making its way posteriorly, so being forced down by the advancing head rupture externally occurred through the inferior triangular ligament under the descending ramus of the pubis. A review of the literature showed that Dr. Williams of Baltimore has collected thirty-three cases of subperitoneal hematomata, including one of his own. Since that time other cases have been added. As to the etiology, the bleeding has been found to emanate from the capillaries at the base of the bladder instead of the larger vessels. Williams, in his case which came to operation, found only capillary oozing from the inferior and superior surface of the bladder, which was controlled by packing. The majority of the cases reported were hematomata that became apparent following delivery, and so far I have not ascertained any that complicated the second stage of labor. In this case if the hemorrhage had not obstructed the advance of the presenting part there might have been no signs of internal hemorrhage and the tumor mass would have required operative measures for its relief or been absorbed.

SPECIMENS SHOWING DIFFERENT STAGES OF RENAL TUBERCULOSIS.

DR. HENRY D. FURNISS presented the following specimens:

CASE I.—This was secondary to pulmonary tuberculosis, and the operation was done on account of the marked bladder disturbance from which the patient was suffering. The cystoscopic appearance of the ureter on the involved side was characteristic of renal tuberculosis. The specimen shows ulceration of several of the renal papilli.

CASE II.—The patient was seen in December, 1913. She was twenty-two years old. Six years ago she had a tuberculous knee and tuberculous ulna. The ulna was treated by incision, curettment and drainage, requiring one year to heal. On January 15, 1913, she passed bloody urine on three occasions in rather large amounts. Following this there was some frequency of urination and the passage of blood. In January, February and March she had vesical pain and was in bed on account of it. Since April 13 she has had three attacks of renal pain, the last one being in October. She now complained of frequency of urination and at times pain in the right renal region. Cystoscopy showed some induration in and around the right ureter. Purulent urine was obtained from the right kidney, which after four examinations was found to contain tubercle bacilli. On the left the urine was free of pus and contained no tubercle bacilli. On October 21, the right kidney was removed; the ureter was found thickened, was tied twice and cut, and the wound closed without drainage. There was an uneventful recovery. In the upper pole of the kidney are to be seen two wedge-shaped areas, tuberculous in character.

CASE III.—The kidney was removed on November 6, 1912. The patient for several months had been suffering with a renal pain, pyuria and occasional hematuria. Over the cortex of the kidney were seen scattered miliary tubercles, which were quite numerous on the lower pole. On section some of the papilli in the lower pole were to be seen. In this case the ureter was brought out on the side through a stab puncture after the method of Robsing; the ureter was retracted. Six weeks after the operation, the patient developed a tuberculous fistula which took six weeks to heal.

CASE IV.—This patient was seen on January 9, 1914. She was thirty-seven years of age. In 1907 she had some abdominal operation but did not know what it was done for. In 1908 she had an abscess of the hip which involved the bone; shortly after this she had an abscess in the left inguinal region, which opened and was drained. It was a year before these closed. Within the last year she has had a number of attacks of chills and fever, the last being in December, 1913. For many months she had noticed turbidity of the urine, but no blood. The left ureteral orifices are normal, with pus-free urine from this side; the right ureteral orifice has around and surrounding it, especially on the anterior side, several nodules; there is a thickened induration round the ureter on the right side. There was a marked polyuria, the urine being very light in color, and containing many tubercle bacilli.

On January 11, the patient had a chill, rise of temperature, and pain on the right side. This perisisted for six days.

On January 30, a right nephrectomy was done and the wound was closed without drainage. Four weeks after the nephrectomy a tuberculous fistula developed in the posterior angle of the wound, which still continues to discharge a slight amount of serous fluid.

CASE V.—This patient was operated upon January 12, 1911. She was then twenty-eight years old.

In 1903 she had an attack of acute cystitis, which was ascribed to catching cold; following this she had some frequency of urination. In the fall of 1908 she had a brisk hematuria for two days, and she had a nervous breakdown in the fall of 1909. Pus casts and albumin were found in the urine at that time. She was fairly comfortable until the spring of 1911. Since she has had marked frequency of urination and has lost weight; she has been getting up five to twenty times at night.

Cystoscopy shows induration around right ureteral orifice which was diagnosed as tuberculous; the urine from the left kidney was free of pus and bacilli; tubercle bacilli were found in the bladder urine. A right nephrectomy was done and drainage kept up for two days. Three months after the operation the patient developed a tuberculous fistula which persisted for six months. The patient has at times attacks of cystitis. Cystoscopy shows some ulceration on the anterior wall of the bladder; the right ureter appears as an uninflamed golf hole.

CASE VI.—This specimen shows the lesion of an acute hematogenous nephritis in which the colon bacilli and streptococci were recovered.

CASE VII.—This was a growth of the lower pole of the right kidney. The accompanying pyelograph shows a distortion of the renal pelvis caused by the growth.

CASE VIII.—In December of 1907 this patient had an abdominal operation for carcinoma. Two weeks later she developed a ureteral vaginal fistula which he repaired by a plastic operation through the vagina. She did very well until January, 1911, when she began to be troubled with marked irritability of the bladder and noticed a heavy sediment of pus in the urine.

Cystoscopy showed the left ureter as a round opening the diameter of a match stick from which purulent urine was seen escaping. On March 11, the left kidney was removed. This was densely adherent and much smaller than normal. On section the ureter was seen markedly dilated, the pelvis distended with atrophy of the cortex. It would have been better to have implanted the ureter abdominally rather than through the vagina, as the obstructed vesical end caused back pressure and atrophy as shown in the specimen.

CASE IX.—This patient was seen April 21, 1913, when she was fourteen and a half years old. In April, 1912, she began to have some pain in the lumbar region associated with nausea, vomiting and headache, the pain lasting one or two hours. During the attack the amount of urine was lessened and after the attack was normal.

For the past year the urine has been cloudy, but the patient has not noticed any difference during the attack. At first these attacks came every month or two, but since then the attacks have become more severe and last from four to six hours. For the past two months they have come every six days. The radiographs for stone were negative. Cystoscopy was negative. The urine from the right side was free of pus, that from the left side contained much pus. On May 5, the left ureter was catheterized. There was no flow of urine

until the catheter was pushed into the pelvis of the kidney, when 1 ounce of purulent urine was collected. Phenolsulphonophthalein was injected intramuscularly and appeared in the left urine after nineteen minutes had passed and within one-half an hour only a trace was eliminated. Normal elimination from the right was noticed.

On May 6, the pyelograph of the left kidney shows an indistinct shadow which consists of three portions the size of a half dollar, more or less separate. She passed black urine for twenty-four hours following the examination. On May 14, 1913, a left nephrectomy was done. The specimen consists of a kidney 10.5×3.5 centimeters. The pelvis is greatly dilated, measuring 4.5 in diameter. On section the kidney consists of a sclerosed sac containing clear fluid and surrounded by firm connective tissue and the narrow rim of the kidney tissue from 1 to 3 millimeters in thickness. A diagnosis of hypernephrosis was made. Microscopically there are present small areas of fairly normal kidney tissue. Elsewhere there is a pronounced fibrosis with areas of partial or complete disappearance of tubules and many sclerosed glomeruli. Nodules of round cell infiltration are frequent. Many of the collecting tubules appear distended. Casts are frequent in the convoluted tubules, especially in the sclerosed area.

Since the operation the patient has been completely relieved of symptoms and is in good health.

CASE X.—This patient was first seen February 19, 1912. She was a school teacher and fifty years old. Menstrual history and menopause uneventful. She has one child fifteen years old. Her history previous to her present trouble is negative.

Her attention was called to her bladder for the first time last summer, when she had some bladder irritation and a moderate hematuria. This lasted for two weeks and cleared up under some form of medication. For the past three months the patient has been having painful urination, and frequency. The urine is passed easier with the patient standing. When sitting there is marked tenesmus upon attempts to urinate. Of late she has at times noticed some rectal protrusion after straining. The urine has been very turbid and a large part of the time has had enough blood in it for the patient to notice. The patient has lost much weight and strength.

Cystoscopic examination shows a more or less smooth rounded mass arising from the right side of the bladder from above and to the outer side of the urethra. At its base it appears of the thickness of the thumb, extends inward for an inch, and is somewhat broader three-quarters of an inch from the base than at its base. The trigonum is very red, infiltrated and thrown into small folds.

Diagnosis was made of carcinoma of the bladder, primary. No glands could be felt anywhere, and no other abnormalities could be detected bimanually.

She was not seen again until April 10. She reports that since last seen the bladder tenesmus has been very severe, that she has to void most the time, and that there has been rectal prolapse. The

urine has become ammoniacal and causes severe burning, and has produced an eczema of the thighs. She has passed numerous small bits of tissue that was reported to be fibroma. She has lost much weight and strength since seen last February. Examination per vaginam shows a mass the size of a duck's egg in the bladder region, most of this lying to the right of the median line. Examination with water cystoscope was impossible. With the Kelly and the patient in the knee-breast posture, practically nothing is to be seen except a mass covered with phosphates that bleeds readily on touch.

On April 12 a bilateral lunar ureterostomy was done, a ureteral catheter being tied into either ureter. Both ureters were moderately dilated. A silk ligature was placed at the upper angle of either wound, this ligature passing through the external coats of the ureter. The next day urine from both kidneys showed a moderate amount of pus, a few epitheliated and many hyaline and finally granular casts, and a few epithelial cells. There was a moderate ring with Heller's test. On the left side a fistula into the ureter occurred at the site of the retaining suture. To close this a catheter was left in for several days, and this caused an infection of the renal pelvis which is clearing up under irrigations with boric acid solution. The right side had no more pus than at the time of operation.

On April 27, the bladder was moderately distended with boric acid solution and a ligature passed around the urethra. A median abdominal incision from the symphysis to the umbilicus was made. Both internal iliac arteries were ligated. The peritoneum was divided in the mid-line over the posterior surface of the bladder as low as the anterior cul-de-sac and the bladder peeled out with very little hemorrhage, this occurring on dissecting the bladder low down laterally. Had the ovarian arteries been ligated, and the collateral circulation through the vaginal branches of the uterine thus been controlled, the operation would have been almost bloodless. When the bladder had been so separated that the only attachment was the urethra, the vagina was opened from above under the urethra, and then by continuing the incision around the urethra through the vagina, the whole bladder and urethra were removed. As the operation was almost finished a small opening accidentally was made in the anterior wall of the bladder through which some foul fluid escaped. An iodoform drain was placed from the anterior cul-de-sac through the space from which the bladder was removed and into the vagina, followed by closure of the abdominal wall in layers.

The abdominal wall broke down and there was extensive sloughing of the fascia. The patient died one month after the cystectomy from chronic suppuration of the wound.

The specimen as shown was put up by Dr. Sondern. The bladder was first hardened, and the incision which runs in the median line was made through the under side of the bladder. Springing from the right side of the bladder, above the urethra, is seen a large growth, as large as a duck's egg, which in the section of the bladder was so divided that a small portion of the growth is on one side and the greater portion on the other of the specimen.

EXCEPTIONALLY RAPID MANIFESTATION OF SEPSIS FOLLOWING CURETTING AFTER SPONTANEOUS ABORTION.

DR. HERMAN J. BOLDT.—This patient was twenty-three years of age and in her first pregnancy. She aborted spontaneously at about the eighth week. She was seen in consultation with two physicians on the afternoon of March 21. She had aborted on the previous day and because of some bleeding the doctor thought the abortion was incomplete. She was curetted at about eleven o'clock in the forenoon and the following afternoon her temperature began to rise, after she had had a chill. She had a temperature of 103.4° F. and a pulse of 140. She was at once transferred to the hospital and the uterine cavity irrigated with iodine water and the cul-de-sac extensively opened and packed with iodoform gauze. Bacteriological examination showed a streptococcal infection. By the following morning the peritonitis was general and death occurred on the third day. Large quantities of serum exuded from the peritoneal cavity from the time that the colpotomy was done.

LARGE ABDOMINAL WALL ABSCESS OF UNKNOWN ORIGIN.

DR. HERMAN J. BOLDT.—This patient had had a large ovarian cyst removed eight years previously. Since that time she had had two children and was now pregnant again about five months. During the past three weeks she had had fever and at times was chilly. Her medical attendants thought she had "grippe." When seen in consultation there was a hard mass in the abdomen about 5 inches in diameter. It was evident that it involved only the parietes. Though painful to pressure there was no fluctuation. A diagnosis of abdominal wall abscess was made. On opening it about 100 cubic centimeters of foul pus escaped. No foreign substance was found in it. The walls of the abscess were about 1 inch thick and edematous; this might be the reason why the other physician had not made the diagnosis. Bacteriological examination showed non-hemolytic streptococci in short chains. No other microorganisms were found.

CASES OF MYOFIBROMA.

DR. HERMAN J. BOLDT.—This patient had evidences of cardiac changes as the result of profuse bleeding caused by the tumor. She was thirty-eight years of age and had been bleeding profusely at her menstrual periods for nine years, the periods continuing for ten or twelve days. The tumor pressed upon the bladder causing frequent micturition. The blood pressure was eighty on the diastole and 140 on the systole. Examination of the cardiac region showed a very sensitive area at the junction of the second sternocostal cartilage junction, and another sensitive area at the base.

A second patient, forty-two years of age, and also having a myofibroma causing profuse loss of blood at the menstrual period, had a blood pressure of 160 on the diastole. There were no cardiac changes ascertainable. The tumor showed only the usual changes of that type of neoplasm under the microscope.

A third patient from whom a myofibromatous tumor was removed complained in addition to the profuse bleeding, of intense headaches, most severe about one week before the bleeding began. Since operation the headaches had ceased.

A fourth patient, forty-eight years of age, had bled profusely for three years at intervals of three or four weeks, and during the interval had profuse leucorrhœa, occasionally blood-stained. The uterus was nearly three times the normal size. It was removed by the vaginal route. The microscopical examination showed a marked increase of fibrous connective tissue, without increase of the muscular elements. The walls of the blood-vessels were markedly thickened.

A LARGE HYDROSALPINX WHICH CAUSED AN ERRONEOUS DIAGNOSIS.

DR. HERMAN J. BOLDT.—The diagnosis which had been made and which gave the indication for the operation was ovarian cyst. If the diagnosis had been correct, the distended tube would have been excised by the vaginal route and drained, since the fluid is not obnoxious in such cases, and the pressure symptoms would have been equally well relieved.

CARCINOMATOUS UTERUS REMOVED BY RADICAL ABDOMINAL OPERATION.

DR. HERMAN BOLDT.—There were no glandular enlargements and the lateral walls of the cervix showed no evidence of the disease having gone outside the boundaries of the uterus, according to the pathologist's report. From the history one would have expected more involvement. The endometrium showed the changes of endometritis.

CASE HISTORIES ILLUSTRATING INTESTINAL COMPLICATIONS OF THE PUERPERIUM.

DR. HENRY P. DEFORREST.—We are in the habit of regarding intestinal complications as essentially medical in character, but occasionally surgical conditions arise which may be followed by severe and even fatal results. The diagnosis in such cases is at times by no means easy, and it is surprising what nature unassisted by a physician may effect in the way of a cure. Such a complication is well illustrated by the following case:

This patient, a woman thirty-four years of age, came under my observation in August, 1903, pregnant for the first time. She had been subject to intestinal difficulties, constipation and indigestion all her life. Her mother had given birth to four children, all the labors being instrumental and all difficult. The pelvic measurements and the antepartum examination of the patient showed nothing abnormal. Labor was expected to occur on March 14. On January 22, the patient had a severe attack of nausea and vomiting with considerable pain in the right iliac region, as a result of which she said she felt something give away in her right side. In February she began to notice black spots before her eyes. Dizziness with vomiting began and she says she has vomited many times during the previous ten days. An exceedingly small amount of albumen was found in the urine so it seemed wise to allow the pregnancy to

progress. Under a restricted diet the headache and black spots disappeared but the pain in the right side which had abated reappeared and was at times severe. On March 10, her condition of alternating chills and fever and spots before her eyes became so much worse that it was decided to terminate the pregnancy. Slow manual dilatation of the birth canal was performed, the child was then extracted by version, and lived. The child is still living but had a number of convulsions during the first month of life. The cause of these convulsions was never apparent though it is probable that they were due to toxic condition arising from maternal causes.

After labor it became apparent that a large tumor mass existed in the right iliac region, some 3 inches in diameter, corresponding to the position of the ascending colon. As soon as the intraabdominal pressure was removed a profuse diarrhea occurred lasting the first five days of the puerperium. In the meantime the tumor mass gradually changed its position from the right iliac fossa first to the hepatic flexure of the colon, and later to the middle of the transverse colon. The temperature showed wide ranges from 97.5° to 106° F. in twenty-four hours. On the fifteenth day the patient experienced some unusual sensations in the epigastric region, the tumor suddenly disappearing and a few hours later there was passed by rectum a piece of small intestine about 10 inches long, quite black and gangrenous. Evidently when something gave away in the right iliac region in January an invagination of the small intestine through the ileocecal valve had taken place and this had progressed along the transverse colon until pressure had shut off the circulation in the invaginated portion and sloughing had taken place. The temperature dropped nearly to normal and then rose again. The discharge from the bowels was bloody for a day or two and then gradually subsided. The temperature steadily rose for a week when spontaneous healing of the lesion must have occurred for recovery was uneventful. This happened in 1903 and the woman and child are still living and well.

A second complication of the puerperium is constipation. A large number of women are troubled with habitual constipation which is often exaggerated immediately following labor and intestinal stasis frequently occurs. The temperature in such cases is often indicative of the nature of the conditions unless infection of the birth canal is coexistent. A chill was not apt to occur but two or three days after labor there might be a rise of temperature of several degrees. An accurate diagnosis must be reached by exclusion for it is easy to suspect infection to be the real cause of the temperature in the puerperium.

The case illustrating this was delivered after a normal labor of her third child and did well during the first three days postpartum when her temperature steadily rose to 101° F. She had suffered from habitual constipation for some years. A tablespoonful each of castor oil and glycerine were mixed together and given in a glass of lemonade, and a high enema was also administered. The bowels moved freely and the temperature subsided.

In other cases the temperature might remain normal for a number of days and then suddenly rise to a very considerable elevation.

One of the best formulæ for speedy and thorough evacuation of the bowels in such cases and indeed in all cases of toxemia is the following:

℞	Olei Tiglii	m $\frac{1}{4}$
	Olei Anisi.....	m $\frac{1}{2}$
	Olei Ricini.....	m xx
		One capsule.

Four of these capsules usually cause thorough watery catharsis without griping in from thirty to sixty minutes.

The following case is illustrative of a puerperium complicated by acute gastritis. The patient was twenty-two years of age and a primipara. Labor had been uneventful but the patient did not recover well. For several weeks the lochia was profuse. She had almost continuous nausea and if solid food was taken, vomited. A milk diet was continued for seven weeks. There was no other abnormality.

It occasionally happens that delivery takes place during the progress of typhoid fever and it is a matter of some interest to know whether the occurrence of labor under such conditions adds materially to the inherent dangers of the intermittent disease, or whether on the other hand the constitutional toxemia which occurs with typhoid influences the morbidity of a woman during the puerperium. The following illustrative case history I am permitted to give through the courtesy of Dr. John M. Taylor of Brooklyn.

The patient was twenty-four years of age, pregnant for the second time, developed a general malaise at about eight and one-half months. She was up and about but when her physician was called it was found that she had a temperature of 102.5° F. and a pulse of 100. She was put to bed and after thirty-six hours labor began. After five hours' labor she was delivered of a full-term child weighing 7 pounds. The temperature of the mother persisted and a Widal test made three days after labor gave a positive typhoid reaction. The mother passed through a typical attack of mild typhoid fever, her temperature becoming normal on the fourteenth day after labor and further convalescence being uneventful. The infant showed no evidence of the disease nor did any of the family contract it.

As an instance of a puerperium complicated by general enteritis (*Bacillus coli communis*) and followed by septic neuritis the following case is typical.

The patient was an American woman, thirty-three years of age, who came under my care for her second pregnancy in April, 1913. The first pregnancy and labor in 1908, at which time I attended her, was uneventful. During her early life she had suffered from repeated attacks of tonsilitis and a moderate degree of exophthalmic goiter. Her tonsils were removed when she was nine years of age but the infections continued to occur. She was of nervous temperament. When about one month pregnant she had a violent attack of tonsilitis, which as there was little tonsillar tissue left, was treated by polyvalent vaccine, 750,000,000 organisms being given every fourth day for five injections.

The morning sickness stopped about the middle of June and soon after a profuse secretion of saliva began after each meal. The salivary symptoms subsided and then followed a period of some weeks when palpitation of the heart was quite noticeable especially after a nap. This continued for about one month. The subsequent course of the pregnancy was normal and free from discomfort. The symptoms mentioned were doubtless nervous in character and dependent on the Graves' disease. Her accouchement was expected about December 26. On December 10 she was forced to do her own work and became very tired. Some intestinal disturbance with slight nausea developed on the following day. And the next night the membranes ruptured and the patient was taken to the Brooklyn Maternity Hospital and she was delivered of a baby probably two weeks premature.

The patient's temperature during the first twelve days of the puerperium was at no time above 99° F. though her pulse remained between 80 and 90 most of the time. There was much intestinal disturbance during this entire period. Diarrhea alternated with constipation and a general enteritis seemed to be present, probably the result of the overexertion, irregular meals and fatigue of the few days preceding labor. The uterus involuted normally and the lochia was moderate in amount. As a precautionary measure a mild lysol douche was given daily after the third day. On the 26th of the month the patient had been up for a day or two and planned to return home, but on this morning she had a slight headache and rise in temperature. In the afternoon she began to have severe pain in the right leg over the area of distribution of the anterior crural nerve and the leg became slightly swollen. Pelvic examination was quite negative. Some extragenital source of infection seemed to be the cause and Van Cott's polyvalent vaccine was at once administered. On the following day the temperature still remained at 100° F. The local area of pain was the same but the veins were not involved and a diagnosis of infectious neuritis of the right anterior crural nerve was made. On December 29 severe pain occurred in the left leg in the same area as before upon the right side. The leg was slightly swollen. In the belief that owing to the intestinal condition the infection had its origin in the colon bacilli, a vaccine of this organism was administered, 50,000,000 the first day, 1,000,000 the second, 4,000,000 on the fourth. The temperature steadily rose on these days until, on the first of January it had reached a maximum of 102.2° F. An enema was given daily and globules of ten drops of castor oil, containing 1/8 gr. of podophyllum were administered to increase the secretion of bile and favor intestinal antiseptis. Both legs had been kept wrapped in flannel and surrounded by hot water bottles as a precautionary measure and to give the patient comfort.

January 1 marked the crisis of the attack. The pain and swelling steadily and promptly subsided and on January 9 the patient was able to return home. Some slight discomfort in walking persisted for about a month, chiefly due to a certain amount of muscular weak-

ness. The feet were at no time seriously affected, nor was there at any time any disturbance of the circulation. The patient complained from time to time of a sensation of water running down her legs as though she had urinated involuntarily.

It may justly be concluded that this was a case of septic neuritis occurring as the result of intestinal infection from the *Bacillus coli communis*. This was not puerperal in character but was doubtless caused by the fatigue and intestinal disorders just before labor. Occurring at the time it did the differential diagnosis between this condition and phlegmasia alba dolens was of much practical importance.

As illustrative of the puerperium complicated by intestinal parasites the following case may be cited:

The patient was delivered of her first child December 11. There appeared to be no reason why the puerperium should not follow a normal course. Within a few days a wide range of temperature was observed. A certain amount of discharge was noticed in the intestines and quinine was administered as an intestinal antiseptic for several days.

TRANSACTIONS OF THE SECTION ON GYNE-
COLOGY AND OBSTETRICS OF THE MEDI-
CAL SOCIETY OF THE STATE OF
NEW YORK.

ANNUAL MEETING, NEW YORK CITY, *April 28-30, 1914.*

Chairman, ROSS MCPHERSON, M. D., of New York.

Secretary, H. HUDSON LIPES, M. D., of Albany.

(Continued.)

Session of April 29.

DR. ROSALIE SLAUGHTER MORTON, of New York, read a paper on

DYSMENORRHEA.

The paper dealt with the causes and effects of pelvic congestion together with suggestions as to treatment. She referred to the view of many gynecologists who considered more or less pain at the menstrual period quite normal. Dr. Morton thought it would be quite as scientific to say that we have no reason to designate as indigestion, pain observed in the stomach after taking food. The menstrual hyperemia of the uterus is as physiological and should be as free from pain as the postprandial gastric hyperemia. Dr. Morton showed that each tissue in the body to perform its function naturally must receive the proper amount and quality of blood. Most of the tissues of the body receive only the blood necessary for the performance of their work and there is less need for variation in every other organ than in the uterus. The rigidity of the pelvic walls, the necessity of the large supply of blood to the lower extremities passing through the pelvis, as well as that needed for its contents, renders it absolutely necessary that the circulation should be unimpeded. Our attention is so centered on the ovarian, uterine and vaginal blood-vessels, it is easy to overlook the importance of the circulation in the right and left common iliac veins, in the anterior and posterior divisions of the external and internal iliacs on each side of the pelvis, in the ilio lumbars, internal pudics, and in the sciatics; as well as in the obturators, middle and lateral sacrals, superior middle and inferior hemorrhoidals and vesical veins and the corresponding arteries.

The readiness with which congestion occurs is increased by the upright position by the fact that much of the return flow of blood from and through the pelvis is carried by venæ comites with no valves and the veins form many plexi in the loose connective tissue around the uterus, vagina, rectum, and bladder. When one considers there

are thirty-six named arteries in the pelvis, besides many branches receiving a quick impact of blood with every heart beat, and that constipation alone may interfere with the entire venous return, it is not surprising that some degree of congestion is frequent.

The baffling discrepancy in diagnosis regarding whether displacements cause dysmenorrhea is probably due to the fact that a retroverted uterus may cause no discomfort either during or between periods, if the circulation is not interfered with, and a slight displacement may give marked symptoms if accompanied with congestion of the uterus or surrounding tissues.

The tortuosity of the uterine and ovarian arteries and the multiplicity of their branches to allow for the rapidly increasing size of the fundus in pregnancy and the abundant supply of blood to the fetus, render flexions of the corpus more serious than versions, as they more readily produce congestion and as the vessels are more direct on the posterior surface, anteflexion is more commonly associated with pain. The collapsible walls of the veins are more compressible than the arteries and if the flexion is so acute as to interfere with the circuitous route of the venous blood through the anterior uterine plexus, stasis occurs.

The intimate relation of the terminal filaments of spinal and sympathetic nerves to the muscle fibers and arterioles of the uterus and adnexa, and the numerous ramifications of these nerves, account for the sense of discomfort without definite pain which accompanies the premenstrual congestion in hypersensitive persons. The location of the sacral plexus and the relation of the anterior crural and anterior division of the obturator nerves to the ovaries, make backache and shooting pains down the legs logical symptoms. The normal period comes on without the patient being conscious of it until it makes its appearance, if the uterus is well suspended by the uterosacral ligaments and balanced by the broad and round ligaments—the bladder not overfull and the rectum empty as it normally is except a few minutes before defecation. There is abundant room for the uterus even with the physiological enlargement which exists at this time. The gradual flow of blood through an obstructed os and vagina is attended with no pain. If there is inflammation and its attendant congestion of endometrium, tubes and ovaries, it is a matter for diagnosis and treatment. The idea that dysmenorrhea will right itself is an absurdity in all cases except those due to undeveloped organs, and even if the uterus is small dysmenorrhea should not be diagnosed as due to lack of development until the patient has been thoroughly examined to ascertain the relation of her monthly pain to abnormal conditions which may exist in her respiratory, circulatory, digestive, renal and nervous systems. The direct bearing of these, as well as normal and properly adjusted bones and muscles is frequently overlooked in an undersized, poorly nourished individual. Our increasing methods of, and opportunity for thorough diagnosis, make it possible, when we explain conditions to our patients and get their intelligent and interested cooperation, to make all cases of dysmenorrhea curable.

Dr. Morton stated that she had frequently found cases which had persisted for years, markedly improve in a month and soon recover by systematic regulation of diet, drinking sufficient water, periods of rest, hours of sleep, neutral baths, deep breathing, graduated outdoor and indoor exercises and strict attention to many minor details, each in itself trivial, but together determining whether the patient should be a semiinvalid or an efficient person. It was opposed to common sense to allow a woman to suffer for approximately one-third of her most useful years, for many patients are incapacitated for competent work ten days out of the month if one counts the time they are below par before and after the acute pain. Neurasthenia is a more frequent result than cause of dysmenorrhea.

The increasing economic value of a woman's time and industry during the past twenty years, leads an increasing number of patients to seek relief for dysmenorrhea while formerly this class of cases patiently bore the ills they considered feminine flesh unhappily heir to. A wider knowledge of personal hygiene associated with the outdoor activities of women have greatly raised the individual standard of health. The percentage of dysmenorrhea depends largely upon development of the individual. Kelly's statistics give 70 per cent. of college women free from dysmenorrhea. Dr. Morton found among poorly nourished, overworked, factory and store employees, 7 per cent. with no pain at periods.

The relation of leucorrhœa to congestion is obvious if the organs contain an excess of venous blood filled with carbon dioxide, tissue tone is lowered and the mucous membrane degenerates, the glands which it contains are stimulated to excessive work by over supply of blood. This produces an excess secretion and leucorrhœa results, which soon causes excoriation of the os. The menstrual congestion adds just sufficient tension to the chronically inflamed tissue to produce dysmenorrhea. The leucorrhœal discharge alters the normal secretion of the vagina and produces vaginitis. The attendant congestion is increased at the period by increase in circulation and by the irritation of blood, mucus and corpuscular detritus flowing over the inflamed surface. This type of dysmenorrhea quickly yields to warm medicated douches, ichthyol glycerine tampons, especially if the latter are made of a soft wool which does not swell.

The tight corsets generally worn in 1880 not only interfered with the pelvic circulation by crowding down the intestines but by pressure on the liver assisted portal congestion which was encouraged by sedentary habits. The dresses of the period show the women who wore them had round shoulders and contracted chests, which interfered with aëration of the blood and with the general circulation to such an extent that neurasthenia from anemia was prevalent. Women became so used to slight ill health due to the effect upon every organ of incorrect posture and lack of exercise that the observations regarding them must differ from ours made from the more robust type of our time. The danger of the style of dress worn by a limited number of women of to-day is the tendency

to constrict the hips, for as soon as the distribution of blood in the lower extremities is interfered with, there is a compensatory engorgement of the arteries in the pelvis. A number of cases directly due to this have come under my care in the last two years. The relation of the health of American women to their present activities, in tennis, golf, riding, rowing, swimming, walking, etc., is a tempting line of digression and would account to a large extent for the different conclusions drawn by Prof. Martin whose observations are based on German women. Unilateral or bilateral ovarian dysmenorrhea is frequent in a patient in whom one or both ovaries are small, somewhat sclerotic or cystic, and it is not uncommon for the patient to complain of a throbbing pain probably due to the ovarian arteries coming off directly from the aorta and the resistance offered by the thickened ovarian tissue raising the blood pressure. The relation of blood pressure to dysmenorrhea has many interesting variations which would come within the scope of a paper dealing with systemic conditions in relation to gynecology, as the nutrition of the pelvic nerves depends largely on the quality and amount of blood going to the spinal cord and to the sympathetic ganglia. Pain in the ovaries and uterus at the same time suggest that both are suffering from a common cause. This is usually obstructed circulation, the pain increasing in ratio to the amount of premenstrual congestion and the amount of resistance offered. In the infantile type of uterus, the blood-vessels are too small to receive the increased amount of blood necessary to establish the menstrual hyperemia and there is consequent engorgement of contributory vessels. One of the frequent causes of pelvic congestion Dr. Morton found to be loss of tone of abdominal, diaphragmatic and intestinal muscles. Present methods of studying intestinal stasis by repeated x-ray examinations after a bismuth meal, bring to light a variety of conditions bearing directly on dysmenorrhea which will make accurate diagnosis and relief possible in cases hitherto dismissed as neurasthenic. Ptosis of the stomach to the pelvic brim, complete prolapse of the transverse colon, acute angulation of the hepatic or splenic flexure, or both, and dilated rectum are active causes of pelvic congestion. Pressure of a misplaced or wandering cecum or complete prolapse of the sigmoid into the fossa between the uterus and the bladder or into Douglas' pouch, is not uncommon. The amount of interference with circulation in the left Fallopian tube and ovary when they are embedded in the mesentery of the sigmoid was shown in a case recently operated on, where freeing these adhesions a dysmenorrhea was cured which had necessitated the use of opiates for seven years since the onset of the menstrual period, the patient suffering abdominal and pelvic pain, nausea and anorexia for two days before each period, as well as during the flow.

Dr. Morton referred to several young patients who came under her care with a history of habitual constipation, of never having been vigorous, but no definite pain until onset of menstruation. On examination the uterus and adnexa have been found normal but a prolapsed sigmoid with slight intorsusception and consequent obstruction of rectum have been found. On correcting these the

dysmenorrhea have disappeared. Congestion of the uterine lymphatics has a direct relation to dysmenorrhea. The close network surrounding the uterus, tubes and ovaries must have free drainage into the deep inguinal glands, or nutrition is interfered with. The clotting quality of blood is lessened if there is excessive admixture of lymphoid substance, and hemorrhagic conditions arise; if, on the other hand, the lymph supply is reduced dysmenorrhea arises from the coagulation of the menstrual flow, creating a foreign body which excites colicky uterine pain. Obstructive dysmenorrhea is often associated with mild infections owing to the development of purulent leucorrhoea due to bacteriological infection of retained alkaline secretion of the uterus. If the lymphatic circulation is impeded so that it cannot do its share in overcoming the resulting toxemia, the condition becomes chronic and spreads to the tubes.

Sterility is so often associated with a history of pain from the onset of the periods that it is not fair to those who later have a duty and the right to become mothers to deprive them of this, by not even trying to find the cause of the dysmenorrhea. Education regarding the normal period being painless will lead to patients seeking relief before serious conditions arise. No disease starts with its climax and the faulty "let alone" teaching of centuries has led to all minor conditions being ignored until they have become serious.

As congestion forms so large a part of the various causes of dysmenorrhea and relief by dilatation of the surface capillaries is so commonly sought by the use of whisky, gin, or other alcoholics, Dr. Morton turned her attention to the use of some method of relieving the stasis by postural treatment, and while the well-known knee-chest position is useful in many cases, she found that instructing a patient to put a blanket over an upturned chair in order that she might lie with the hips elevated and the muscles generally relaxed is better, as patients can remain in this position for a longer time and use no energy or muscular contraction to maintain their balance. As chairs vary greatly in their strength and adaptability to this, she had a table made for postural treatment for the relief of pelvic and abdominal ptosis and venous and lymphatic congestion. The force of gravity also assists in correcting retroflexion, ante-flexion and prolapse of the uterus, and by relieving the strain on the ligaments, helps them to recover tone. The table can be adjusted to the height of the individual and the amount of inclination desirable in the treatment of the case. Dr. Morton also found the table valuable for giving douches to patients who have an inflamed vaginal vault or congested cervix, for in the horizontal position when these pathological conditions exist, the mucous membrane of the upper fourth of the vagina and that reflected on the cervix are not reached. The table is practical for home use as it is inexpensive, can be folded up and put aside when not in use. The drainage of the pelvis is much improved by instructing the patient to practice deep breathing while lying in the Trendelenburg position ten to twenty minutes two or three times a day. Inhaling slowly forces the diaphragm gradually down; exhaling quickly produces a sudden relaxation which relieves the abdominal and pelvic contents of pressure.

Good results were also obtained by advising patients to develop the muscles in the round ligaments by throwing back the shoulders, taking a half breath, fixing the chest quickly, contracting and drawing up the abdominal muscles. This lifts the uterus. These mechanical aids are only adjuncts to the hydrosopic use of boroglyceride tampons and such other local and systemic measures as may be indicated.

DISCUSSION.

DR. CAROLINE S. FINLEY, New York.—“It seems to me there is little we can add to what Dr. Morton has gone into so thoroughly. As regards the table she has shown, though I have never seen one before, it ought to prove a help for serious cases. I have found that an ordinary chair placed at the foot of the bed does pretty nearly as well for the average patient. Take the ordinary small metal bed, which is usually found in any house and have a chair placed under it, and one gets, I should say, almost as good drainage upward as with the table. Of course that does not apply to the giving of douches, etc.”

“Dr. Morton has not mentioned one point that comes up in private practice very often. That is, should we keep young girls in bed the first day of menstruation. I think I am asked that question by the mother of every half grown girl who comes to see me, and I always advise them if the girl is normal not to do it. Several doctors have said to me lately that they believe that if women stayed in bed during the first day of the period they would have on the whole a more normal menstrual life, and I figured out the average menstrual life is thirty-one years, and the average woman menstruates twenty-eight days and with one day in bed, that would be a little over a year. Most women cannot afford a year in bed. In the cases of dysmenorrhea due to undeveloped organs or due to antelexions, exercise decreases dysmenorrhea. In many cases we find colicky pains are decreased by walking and when a girl menstruates rather irregularly, only two or three days, or a day and a half, with scanty flow I advise exercise after first examining the patient to make sure there is nothing pathological.”

“I do not think that quite enough stress is placed upon errors of digestion during menstruation. A great many women have practically no pelvic pain; the pain they suffer from during menstruation is due entirely to intestinal indigestion. It is the concurrent congestion of the lower part of the intestinal canal which causes the pain in a great many cases. I find that relieving constipation is the quickest and most easy way of helping milder cases of dysmenorrhea.”

“Another point that so many young patients consult me about is leucorrhœa and I find it is the serous discharge that precedes the menstrual flow. The menstruation that begins with a slight exudate of serum and ends with one is more normal than the one that begins with a sudden and profuse uterine hemorrhage.”

DR. MARY D. ROSE, New York.—“I think there is one point that which should be emphasized a little more for general practitioners,

and that is the congestion due to retention of fecal matter in the rectum, which we often find in women with dysmenorrhic symptoms. I have not seen it much dwelt upon in text-books and I certainly have had patients come into my office who have been unsuccessfully treated by other physicians for dysmennorrhea. They say that they have free movements but upon examination you find the retention. The most satisfactory method of relieving these patients is cool salt water low enema used immediately after an evacuation. The first week of treatment they are instructed to use it after every movement, after that they recognize from their own sensations whether the rectum is emptied or not and then use the enema only when necessary."

DR. I. C. RUBIN, New York.—"Dr. Morton has treated her subject in I think a peculiarly original way. The question of congestion, however, it seems to me, has not been scientifically proven. Theoretically there is every reason to agree with Dr. Morton on the question of congestion of the pelvis, as causing a lot of the pain which is common in dysmenorrhia; but it is also true that as Drenkhahn has demonstrated if you inject the proper solution of atropin into the cervical canal, that you can get a cessation of the pain. That stopping of the pain, he explains, comes about in two ways. In the first place, it causes a constriction of the blood-vessels of the uterus, partly of the uterine veins, but this constriction, however, does not act locally, as it does upon the eye, if applied locally, but because of its effect upon the nervous system, particularly the vagus which it depresses. Secondly, the atropin may be taken internally, as was demonstrated by Novak of Vienna, and the same result is obtained. Now, atropin, say in doses of a 75th of a grain, taken in tablets three times a day, brings about this same cessation of pain and must be taken a few hours before the expected period arrives. Atropin also is supposed to effect the spasms of the uterine muscle, and so stills the paroxysm. In that sense, I think that perhaps we are approaching the idea of congestion, as applied to metrorrhagia and dysmenorrhia on an experimental basis, but there are a great many remedies that have been tried, including the minor operative measures of adequate dilatation, curettage, the discisions and hysterotomies and the plastic operations on the cervix. These things would however open up a new field of discussion."

"I may say in general that my personal feeling is that we are getting away more and more from the matter of operative therapy. It is true that a great many girls, especially factory girls, suffer from dysmenorrhia. They suffer more from dysmenorrhia than girls in better social status; and it is also true that by this very ingenious method of treatment that Dr. Morton suggests, you may cure dysmenorrhia in certain cases. On the other hand if you take a factory girl and send her to the country for a few months you may also relieve her condition completely. Now that suggests that the condition is not altogether one of pelvic congestion, but rather that it depends on other factors as well. It may be also a question of nutrition, and it may be a question of chlorosis, anemia, lack of light and other things. Also, it suggests the cause may be psychogenic,

not exactly in the sense of neurosis or hysteria, but due to an irregular stability of the central nervous system. It is also possible that the sympathetic system is disturbed in the same way as the effect of such measures as uzara which stimulates the splanchnic and has been known to have the same kind of quieting effect as atropin which depresses the vagus. "

DR. ROSALIE SLAUGHTER MORTON.—"I have been interested in the additions made to my paper by those who have discussed it. Of course, I do not suggest for a moment that the operative field is to be superseded by treatment of any kind, because there are many cases which are purely surgical. However, it is fair to the patient to consider all systemic and mechanical conditions that may produce congestion or result from it, as the patient should be considered as a whole and treated as such."

DR. EDWARD P. DAVIS of Philadelphia, Pa., read by invitation a paper on

INFECTION WITH THE BACILLUS COLI COMMUNIS, COMPLICATING PREGNANCY, LABOR, AND THE PUERPERAL STATE: ITS MEDICAL AND SURGICAL TREATMENT.

Dr. Davis called attention to the fact that recent studies in obstetrical pathology have added to our knowledge of septic conditions complicating pregnancy, labor, and the puerperal state, infection with the bacillus coli communis.

It is of practical importance to note that this germ does not produce an antitoxin, that it does not decompose urea into ammonia, and hence that when it infects the urinary organs the urine does not become alkaline. It is readily isolated in pure culture from blood taken from the kidneys and from blood obtained from other portions of the body. In the genital tract it is often present with staphylococci; less frequently with streptococci. Its free presence in the organism in considerable quantities causes high leukocytosis, fever which is often extreme, and in severe cases rigors. Although producing a severe action it seems less fatal in its results than the streptococcus.

In pregnancy the action of this germ has been extensively studied in pyelitis. In the experience of the writer, infection of the pelvis of the kidney by the bacillus coli communis is frequently accompanied by appendicitis. The germ gains access to the kidneys by ascending infection from the bladder through the ureters, or by its passage from the wall of the bowel through the contiguous ureter to the pelvis of the kidney. It may also gain access to the kidney through the blood current. From the anatomy of the parts, the right kidney is more often affected, although both may be involved.

The cardinal symptoms of this condition are considerable fever, pain referred in the back to the location of the kidneys, pain in the right lower abdomen, high leukocytosis, and in severe cases chills and great prostration.

The extensive literature of appendicitis complicating pregnancy

shows that this disease runs a particularly insidious course in the pregnant woman. Unless promptly checked by the removal of the appendix, should adhesions and suppuration occur, the uterine wall becomes a portion of the wall of the abscess cavity, and the action of the uterus in expelling its contents must inevitably open this cavity and permit the infection of the peritoneum by its contents.

Those who operate extensively for diseases and infections of the liver recognize the fact that many cases of cholecystitis may be traced to colon bacillus infection during pregnancy. The condition is rarely recognized during pregnancy, and pain referred to the region of the gall-bladder may be ascribed to the pressure of the uterus or the movements of the fetus. Unless cases are thoroughly studied a mild infection passes unnoticed.

Colon bacillus infection of the large intestine complicating pregnancy is seen in women who have neglected hygienic precautions during pregnancy, who have remained obstinately constipated, or who have taken irritant drugs to empty the bowels. The condition may remain latent during pregnancy, but after the uterus is emptied, probably from the disturbance of labor, the patient has abdominal pain, moderate distention, remittent fever, leukocytosis, and many of the symptoms of puerperal septic infection of uterine origin. The pain may usually be localized in the intestine and not in the general peritoneum. The distention and tenderness are limited to the region of the large bowel. If the patient comes to operation a diseased appendix is found, and ulcerated surfaces in the wall of the large intestine may be seen beneath its peritoneal covering. Should the intestinal infection be active and the lymphatics of the peritoneum become involved, death will ensue, with symptoms of general peritonitis. Colon bacillus infection of the large bowel complicating the puerperal state may be mistaken for typhoid, malaria, or septic infection of uterine origin. The differential diagnosis may be made by laboratory study, and proven by section, with removal of the appendix. The colon bacillus may infect the new-born infant, causing icterus and ophthalmia. The colon bacillus may also be the cause of septic abortion. It has also been isolated in pure culture after labor, and hence may be the cause of puerperal septic infection. Its action is not confined in this regard to parturient patients, as it may complicate the recovery of patients operated upon for disease of the pelvic and abdominal viscera.

From this brief summary of the pathology of this condition, as known at present, we must recognize infection with the colon bacillus as a clinical entity of importance, both in prevention and in treatment.

In prophylaxis, as the colon bacillus is most abundant in the colon the parturient patient demands especial attention to the condition of the bowels during pregnancy. As it is impossible to complete the removal of the colon bacillus, such laxatives must be used as shall not irritate the mucous membrane of the bowel by producing ulceration, which would favor the passage of the colon bacillus into the lymphatics and blood-vessels of the intestine. The writer has seen fatal in-

fection with this germ follow the use of very irritating purgatives taken by the patient with the hope of killing the child and bringing on premature labor. Those laxatives which thoroughly soften the feces, producing a competent daily evacuation, and which can be used for long periods, should be employed. Such preeminently are compound licorice powder, or preparations of olive or petroleum oil. In case where the colon remains persistently distended with evidences of irritation high colonic flushing with sterile salt solution, administered skilfully by a nurse, is of great value. The ordinary enema, as usually taken by a patient, is useless and often irritates and greatly disturbs the mucous membrane and veins of the lower bowel. As the colon bacillus is usually destroyed successfully by the resisting properties of the patient's blood, it follows that anemia during pregnancy must be prevented. Exercises and the absence of constricting clothing to prevent pressure upon the bowel, are also valuable. The patient's complaint of pain in the abdomen must not be treated lightly, and pregnant patients should be examined at intervals, not only to determine the period of gestation but also the condition of the abdomen. Persistent distention, with tenderness in the right lower abdomen, or tenderness in the left lower portion of the abdomen, are significant and demand attention.

During labor the proximity of the rectum to the genital tract exposes the patient to the danger of infection with the bacillus coli communis. The bowels should be thoroughly emptied before labor, and it is well in prolonged and difficult labor to irrigate the colon thoroughly with salt solution. At the moment of delivery the anus should be completely occluded by a pad of gauze wrung out of antiseptic solution, and should fecal matter be extruded during delivery this region should be thoroughly cleansed and precautions taken to avoid wounds in the genital tract.

The treatment of colon bacillus pyelitis complicating pregnancy has been extensively described by various authors. In ordinary cases rest in bed, a diet of pasteurized milk, or lactic acid milk, the free use of mildly saline waters, flushing of the colon, and the application of dry cold for pain, are usually successful. Should further treatment be required, a differential diagnosis by catheterizing the ureters will locate the pyelitis. The infected pelvis may then be irrigated through the ureteral catheter with salt solution, boracic acid, or other dilute and nonirritating antiseptics.

Should these measures not suffice, and should pain be localized over one kidney, it is justifiable to expose the kidney by the usual line of incision, to bring it into the wound, anchor it by sutures passed through its capsule, incise the kidney, and with the gloved finger explore the pelvis. A gauze drain should then be carried into the pelvis of the kidney and the wound closed around the drain. Drainage should be maintained until the wound closes by granulation. If the right kidney is infected the removal of the appendix should precede the drainage of the kidney.

The writer treated successfully three cases, removing the appendix and draining the right kidney by the method described. Pregnancy

was uninterrupted, the patients going on to spontaneous labor with a living child.

Where examination of the kidney shows it to be extensively riddled with small abscesses, the patient having had hectic fever and evidences of pyemia, nephrectomy may be necessary.

The writer desires to draw attention to the difficulty of diagnosis where colon bacillus pyelitis occurs in pregnancy on the right side. Aside from the urinary findings the symptoms may be those of pyelitis, appendicitis, cholecystitis, ruptured ectopic gestation, or salpingitis. Where under careful observation the patient does not improve with physiological rest and simple treatment, surgical exploration is indicated. Should the condition of the kidney and appendix not explain the patient's illness the gall-bladder should also receive attention, and if necessary be drained.

The writer has not had the opportunity of seeing cholecystitis in pregnancy become so severe as to justify operation. Cases which have been suspicious have gradually subsided with physiological rest and have gone on to recovery. Unquestionably this recovery is more apparent than real, for these patients are afterward treated by the general surgeon for chronic cholecystitis. The fact of pregnancy does not in any way contraindicate drainage of the gall-bladder, and the operation should be done, if indicated. In one case the patient passed through pregnancy with considerable pain in the region of the gall-bladder, culminating in eclampsia. From this she recovered with a persistence of the gall-bladder pain. The writer then exposed the gall-bladder, finding that it had disappeared in a mass of adhesions containing several gall-stones. These were removed and the patient made a complete recovery.

Colon bacillus infection of the bowel should be treated by the prompt removal of the appendix, if tenderness can be located in that region. In some cases where the infection is not severe, the symptoms are those of abortion or premature labor. With such patients the leukocyte count should be carefully watched and a careful search made for tenderness and distention, and if these symptoms are not pronounced, and the bowel does not become parietic, the patient may be treated by rest in bed, mild laxatives, irrigation of the colon, and the use of sterilized food which contains little residue. The free use of a mildly saline water is indicated. The writer has seen numerous cases of this condition where the symptoms did not justify surgical interference and where the patient recovered with medical treatment.

Where the colon bacillus infection of the bowel develops after the birth of the child uterine septic infection must first be excluded. This may be done by finding the uterus normal in size without adhesions or tenderness, the lochial discharge normal, and wounds or lacerations uninfected or healed. Should nonoperative treatment fail the patient should be subjected to section, with removal of the appendix. If portions of the intestine have become adherent such adhesions should be separated. The course of this infection is a long one, and recovery is usually protracted. The following illustrative case may be of interest:

The patient was an ill-nourished primipara who had lived in a warm climate. Her labor was spontaneous, with a living child, but fever developed during the first week of the puerperal period. There were no streptococci in the blood nor could puerperal septic infection be recognized. The patient had chills of moderate severity and the temperature was considerably raised, with sharp descent. As supporting treatment did not improve her condition, and no abscess could be found, the abdomen was opened. The patient's symptoms had been fever, malaise, and diffuse abdominal pain, with impaired peristalsis. The appendix was found enlarged at the base, recent adhesions between the coils of intestine, while a portion of the transverse and the entire descending colon were red, thickened, and at one point showed an ulcerated portion beneath the peritoneal covering. The appendix was removed, the adhesions separated, and a gauze pack drain placed at the bottom of the pelvis with a cigarette drain to the former site of the appendix. Salt solution was given during convalescence through the bowel. The drains were removed gradually. The patient's recovery was tedious, and complicated by phlebitis of moderate severity.

In this case the Widal test for typhoid, the examination of the stools for ameba, the Wassermann reaction, and the test for tuberculosis, were all negative.

Infection of the uterus and appendages by the bacillus coli communis gives characteristic symptoms, and may be diagnosed by the bacteriological examination of the contents of the uterus. The treatment of this condition does not differ from that of uterine puerperal infection of other origin, except that the tendency to mixed infection and pus formation in these cases must be remembered. Pelvic abscess may be expected, or multiple abscesses in various portions of the body. These invariably demand drainage.

The fact that the bacillus coli communis forms no antitoxin and that it has so far resisted treatment by vaccines, does not encourage us to hope for brilliant results by the use of sera or vaccines.

Experience shows that patients react very differently to infective bacteria, and especially to the colon bacillus. Some tolerate its presence with little or no disturbance, while others are rendered severely ill. This fact adds new emphasis to the necessity for good hygienic care during pregnancy, so that the pregnant woman may be kept in the best possible condition to resist the action of bacteria. Dr. Davis said that he could not agree with the suggestion so often made that in these cases pregnancy should be interrupted.

Infection with the colon bacillus is a complication of pregnancy or the puerperal state, and pregnancy and the puerperal state are not complications of colon bacillus infection. Disturbance of the genital tract in these cases may open fresh avenues for infection and introduce the germ directly into the blood or lymph channels of the patient. Cases are recorded where labor has been induced with but temporary benefit, operation becoming necessary later, and followed by a fatal issue.

Nor does it seem rational to place any risk upon the mother's

life with the hope of saving that of the child. In severe bacterial infection of pregnancy the child's life depends upon the ability of the placenta to destroy infective bacteria before they gain access to the child. So uncertain are the child's chances that the obstetrician should content himself with giving the mother the best possible care. Should the child die it will be expelled spontaneously, with the least possible disturbance and risk to the mother.

Dr. Davis believed that if this infection be kept in mind in dealing with parturient women, patients will receive adequate treatment more promptly, and that the mortality and morbidity in parturition will be lessened. Rest, hygienic and medicinal measures, should be given a prompt and thorough trial, but if improvement does not follow in a reasonable time surgical aid gives an excellent chance of recovery.

DR. HENRY D. FURNISS, of New York, read a paper on

CYSTITIS COLLI IN WOMEN.

Dr. Furniss referred to the frequency of inflammation of the neck of the bladder in women and stated that it was present in the majority of cases which presented urinary symptoms. The latter are quite characteristic, including diurnal frequency with later nocturnal disturbances. The cystoscope shows different degrees of involvement of the trigonum, including hyperemia, infiltration, or the presence of a peculiar sharply defined whitish area due to desquamating epithelial cells which have taken on metaplastic changes. Associated with these we frequently find an accompanying urethritis, localized in the anterior one-half or two-thirds of the urethra. While passive congestion due to cystocele, retroversion, prolapse, etc., are credited as causative factors, the principal rôle must be ascribed to infection, either recent or remote. Gonorrhœa and colon bacillus infection are the most important. The condition when due to gonorrhœa is more amenable to treatment than when the colon bacillus type of infection is present. Irrigation and medication gives some relief but the best results are obtained by topical applications of silver nitrate (3 to 8 per cent.), autogenous vaccines and in rebellious cases, vaginal cystotomy.

DISCUSSION.

DR. JOHN O. POLAK, Brooklyn, N. Y. "I have listened to this paper with a very great deal of interest, as I always do, to anything from Dr. Davis' pen. We have found that these infections, as he has said, are much more frequent than previous writers would have us believe. We have been so much impressed with their frequency and the possibility of infection of the genital tract by the colon bacillus through primary and secondary repairs of the pelvic floor that for several years we have discarded the use of vulvar pads on these patients and have found that there was a direct relation between the number of colon bacillus infections and the continuance or discontinuance of the vulvar pads. As one can readily see, the

patient after a perineal operation is very apt to soil the pad with intestinal discharges and infect the wound from the same. He called attention to another point upon which we lay special stress, and that is the disturbance of the intestinal tract by active catharsis. About five years ago the head nurse in my obstetric ward said: Have you noticed that we have an exacerbation of temperature every time the routine dose of castor oil is given postpartum? We then began to follow up the matter and found that our observations confirmed her statement and checked up the cases. We took a series of 100 cases in which no cathartic was given and then checked them up against a second hundred in which an ounce of castor oil was given on the second night. No examinations were made except by the abdomen to follow the fetal head through the pelvis. This comparison showed us very decidedly that disturbance of the intestinal tract by active catharsis lowered the patient's resistance. All of us know for instance, that in doing abdominal surgery, that if we prepare our patients with a simple enema we have less disturbance in the intestinal tract from the colon bacillus. This bacillus of all the bacilli that we are apt to deal with, seems to me to have the greatest power of penetration, as is instanced in the infections of the genitourinary tract. The colon bacillus is a frequent cause of cystitis and ascending infections along the ureter to the pelvis of the kidney. We have found a very large number of colon infections of the gall-bladder postpartum. These cases fortunately have in a large majority of instances subsided under the accepted plan of treatment, only to fall later into our hands or the hands of the general surgeon for operation for chronic gall-bladder inflammation."

"I was rather impressed with Dr. Davis' statement with regard to the frequency of appendicitis. I have not seen many cases of appendicitis during pregnancy associated with colon bacillus infection of the kidney. I have seen though, a number of cases of appendicitis in the puerperium, and I was also rather surprised at his radicalism, for we have found that a large number of these apparently clear up and are better operated on later. I have yet to see a case of colon bacillus infection of the kidney that has necessitated the interruption of pregnancy. I have one in mind where the pregnancy interrupted itself as the result of the disease. The point which Dr. Furniss brought out in regard to these cases of trachelo-cystitis is one of the most interesting points that I have listened to. There is no condition that all of us who do much gynecologic operations meet with so frequently as trigonitis and colli cystitis. You ask why does not catheterization produce bladder infections at other times as after a perineorrhaphy and this is the point I wish to call to your attention, *i.e.*, that we forget that we have a superficial infection in almost every puerperal perineal wound and the catheter must pass over this infected area. Catheterization is one of the active causes of this very condition that the doctor has called attention to, particularly where it is due to the colon bacillus."

DR. REGINALD M. RAWLS, New York.—“For the last five years I have been very much interested in colon bacillus infection, and consequently I have given considerable time to the study of the literature, and I have also had the opportunity of studying a number of cases.”

“My discussion will refer to the treatment of these conditions, and I shall make a plea for conservatism. From Dr. Davis' paper, it seems to me, that he is exceedingly radical. He advocates conservative treatment for a certain time, and if the severity of the symptoms persist, then he resorts to nephrotomy. From the literature of the last two years (1912 and 1913), I have collected, the reports of over 400 cases, reported by F. Kidd, Scheidermantel, Oppenheimer, Münnich, Hohlweg, Kramer, O'Connor and Weibel, and these observers concur in the opinion that colon bacillus infection, in the great majority of cases, recovers spontaneously under conservative treatment. Kidd in his series of cases reports 42 per cent. of cures under medical treatment; and combined with pelvic irrigation and vaccine, he failed to cure in only 6 per cent. Hohlweg reports fifteen out of seventeen cured by pelvic irrigation. Weibel finds that the prognosis of pyelitis of pregnancy is so good that the treatment should be directed to the pyelitis alone, and that pelvic lavage is superior to operation. Brewer, in a recent article, has divided the symptoms of hemic infection of the kidney into three groups. First, the hyperacute or fulminating which usually proves fatal in a great number of cases, before any definite renal symptoms develop. Second, a milder infection but seldom recognized until complete destruction of the renal tissue results. Third, a still milder type in character which usually recovers spontaneously. The first two groups certainly demand surgical interference, but in the third type, only conservative treatment is indicated. To this last group belong most of the cases we see in pregnancy and in gynecological conditions.”

“We have so far but comparatively few cases of nephrotomy reported for colon bacillus infection but on the other hand, we find the mortality from nephrotomy rather high in other infective conditions. Hahn and Cunningham in a series of 222 cases of nephrolithotomy, 135 aseptic and 86 infected, give a mortality of 2.2 and 18.3 per cent. respectively. Pousson, in a series of 153 cases of nephritis in which he did a nephrotomy, and in many also a decapsulation, had an operative death rate of sixty-three. My view as to surgery in the treatment of colon bacillus infection was expressed in my article in New York Medical Record of October 7, 1911, which was based on my review of the literature and my study of eighteen cases. It is as follows: ‘We should use all other means within safety, before resorting to surgical interference.’ The definite indication is when the kidney or surrounding structures are so involved that they endanger life. Even in multiple abscesses of the kidney, recovery sometimes takes place spontaneously. Furthermore surgery may only relieve the result and not the cause of the condition, and later we are confronted with a similar condition in the other kidney.’

A word further as to conservative treatment, the giving of hexamethylamin even in large doses is ineffectual in many cases. This is shown by the experiments of Hinman, who found that of 116 patients getting 15 grains, three times a day, that 44 per cent. gave a test for formalin in insufficient amount to cause any antiseptic benefit. In all my cases, I now use as routine acid sodium phosphate (NaH_2PO_4) in addition to hexamethylamin as suggested by Jordon several years ago. He showed that acid sodium phosphate increases the acidity of the urine and that a certain acidity was necessary in order to cause hexamethylamin to break up into formalin."

DR. PAUL PILCHER, Brooklyn.—"The question of the colon bacillus infection of the urinary tract is a very complex one. I think those who have been accustomed to examine carefully all of their cases and catheterize the ureters will often find the colon bacillus coming not only from one kidney, but from both. Now, it seems to me, from our study of the cases, that the danger of the colon bacillus infection of the urinary tract lies in a second factor and that is obstruction. If there is an obstruction and also a colon bacillus infection of the urinary tract, that is the time when the danger begins. I feel very strongly about the question of cutting into the kidney in the presence of infection of the pelvis. I think that one of the most dangerous things to do is to operate on the kidney of a patient whose renal pelvis is infected, and if you are going to cut into a kidney in the presence of infection, I feel that in the majority of cases you ought to take the kidney out. Our results in the cases of pyelitis have been good, and in none of the cases have we operated upon the kidney. We have drained many of them, but we pass a catheter through the ureter to the kidney and drain the pelvis of the kidney in this way."

"Now, as to the question of the infection of the intestinal tract from colon bacillus. Dr. Davis said appendectomy was done in a number of these cases and I should like to suggest one other thing, and that is this, that we have found that the greatest advantage of a permanent nature has come from appendicostomy, rather than from appendectomy. In those cases, appendicostomy can be done under local anesthesia and really is not a difficult operation."

"As to the question of the infections at the neck of the bladder, I am not quite willing yet to agree with Dr. Furniss, for this reason, that to my mind it is not an infection of the bladder. In those cases you very seldom see the bladder itself affected. The part affected is the trigone and the urethra. Dr. Furniss is one who called to my attention first the effect on the urethra, and I would like to insist from my side, that it is more a disease of the urethra than the bladder. The peculiar construction of the trigone differs from that of the rest of the bladder and the mucous membrane covering it passes into the mucous membrane of the urethra and is closely allied to the latter. The treatment is applied to the neck of the bladder and to the urethra, rather than to the bladder itself. In the treatment of these cases we go a little further than he does. We believe that this process originates not from the bladder alone or from infection from above, but that it is a result of a combination of conditions and disorder in

the pelvis, from constipation, from prolapse, from rectocele, from cystocele, and from a number of things which mechanically act upon the bladder, and unless you relieve the mechanical conditions you do not relieve your mechanical irritation. Our treatment is, through an endoscope to dry the mucous membrane and apply a 10 per cent. solution of silver nitrate to the mucous membrane at the neck of the bladder, withdrawing it a little, and making application at intervals down the urethra; then to lessen the pain we inject a preparation of olive oil into the bladder. In addition we advise the knee-chest posture and avoid cathartics. We give an enema to clear the bowel but avoid giving any irritating food and we pay especial attention to the general hygiene of the patient."

DR. EDWARD P. DAVIS (closing).—"The criticisms on my paper have greatly interested me. I am familiar with the literature to which reference has been made. At the last International Congress in London, this subject was discussed by Barr, Weibel, and others, and the consensus of opinion was that in the majority of cases medical treatment is sufficient, but that there is a small percentage which requires surgical interference."

"The statement has been made that, in the paper, I advise surgical interference after a reasonable time, and that suggests the interesting practical question, What is a reasonable time? In acute appendicitis or acute cholecystitis we watch the patient closely and interfere so soon as we have reason to believe that the patient's powers of resistance are yielding to the infection. So long as leukocytosis and the patient's general condition indicate that the immunizing substances in her blood are making a valid resistance, we hesitate about interfering. But when we have reason to believe that she has ceased to resist, while fever and prostration continue interference is justifiable. The idea of time is not a matter of hours or days but a matter of the patient's physical condition."

"If we consult the experience of others, while many cases recover without interference others will be found, in the literature of the subject, where delay resulted in multiple infection in both kidneys, and when interference was finally practised it was too late and a fatal issue resulted. In my experience, in a case seen in consultation with a general surgeon, the advice to operate was declined. The patient was critically ill for several weeks, lost her child, and narrowly escaped with her life."

"In considering cases of infection of the pelvis of the right kidney, we must remember the important part played by pressure in producing this condition. Unquestionably from dextrotorsion of the uterus the right ureter is frequently lessened in its caliber during the latter months of pregnancy. For this reason irrigation of the pelvis of the right kidney through the ureter will be less successful than in other conditions, because drainage is less perfect; and while an antiseptic solution may act temporarily, bacteria will accumulate because the urine does not flow promptly into the bladder."

"I recognize the surgical principle not to cut into an organ in the condition of acute infection, and yet experience shows that free

incision and drainage, even in such a case, is often safer than delay. Experience is, after all, the crucial test. The cases to which I allude were cases where the right kidney was palpably enlarged and where medical treatment and delay had failed to secure improvement. Incision and prolonged drainage gave excellent results, and I should practise the same procedure in other similar cases."

DR. HENRY D. FURNISS, New York.—"I want to take exception to one thing Dr. Davis said about the reason for the right-sided renal infections, namely, the proximity of the appendix to the ureter and to the kidney. I have noticed infections of the kidney either right or left, in cases of appendicitis in which there was no pregnancy and I do not think the infection of the ureter or kidney is due to any direct extension at all. I think all these infections are of hematogenous origin and that the predominance of right-sided lesions is due to the fact that the right kidney is often prolapsed, this causing ureteral kinking and consequent urinary stasis. My experience with kidney surgery, either in opening the pelvis or the kidney, is that if you do not keep them open, drainage will promptly cease. I believe in all these cases there must have been some obstruction below that was not detected at the time. One cause of obstruction is calculus and we should always be on the lookout for it. I saw that in one case recently, where the woman's pyelitis had developed during her pregnancy and I afterward removed a calculus from the right ureter."

"I agree with what Dr. Pilcher said. I omitted some details in my paper, largely because I spoke impromptu. In my talk I did mention that a lot of the congestions of prolapse and retroversion were coincident with the trigonitis and I believe as in the kidney work also, that anything that tends to passive congestion tends toward infection either in the beginning of the infection or in its persistence."

DR. E. M. BROWN of Rochester, read a paper on

PUERPERAL THROMBOPHLEBITIS.

After referring to the desperate form of this type of puerperal infection which carried with it a mortality of 50 per cent. or more, Dr. Brown discussed the question of surgical treatment of thrombophlebitis in the puerperium and reported two personal cases. It has been shown that in a very substantial proportion of cases of puerperal infection the manifestation is in the form of a true pyelophlebitis in the pelvis and in this class the death rate is very large. Does the early surgical interference in such cases hold out any hope as a favorable method of treatment? During the past ten years less than 200 cases thus operated upon have been reported and it would seem that the mortality was about the same as in the expectant plan of treatment. Findlay after reporting a series of cases said that "the Trendelenburg operation is surgically correct in theory but as a practical proposition it is a questionable procedure."

If it is correct theoretically, the speaker asked why it was not

possible for it to be a good proposition practically. He felt that it might be when we have gotten further along in the differential diagnosis as applied to this class of cases. Until a greater refinement of diagnosis has been achieved, Dr. Brown feels that there are many cases in which the evidence is so suggestive that we are justified in giving the patient the benefit of an early exploratory section with the probability that in a very large proportion of cases we will find a phlebitis that can be cured by ligation or excision. In this matter we are now where we were twenty years ago during the discussion of the proper time to operate in appendicitis. Dr. Brown predicted that within a reasonable time we shall be able to report almost as satisfactory results in this condition, subject of course to the limitations imposed by the very nature of the trouble. The question of how much and what kind of operative interference to resort to in cases of puerperal thrombophlebitis must be left to the exigencies of the individual case and the experience of the operator. The speaker's own opinion was that in most cases if a satisfactory ligature can be applied above the thrombus and adequate drainage provided, the patient will be afforded a very favorable chance for recovery. Dr. Brown's first case was as follows:

Mrs. J. H., age thirty-four, para-iii, confined on April 22, 1913. Her pregnancy had been normal until April 15. The labor lasted only two hours and the child was born spontaneously. A moderate peritoneal tear resulted which required two sutures and the placenta was delivered intact twenty minutes after the birth of the child. The lochia was scant from the beginning and the patient complained a great deal of after pains. Thirty-six hours after delivery the temperature rose to 100.6 and the doctor in attendance attempted to dilate the cervix with the idea of providing for a better drainage of lochia. The perineal wound was found to be suppurating on the fourth day and the stitches were removed. The patient was unable to void after delivery and was catheterized at intervals. During this period the temperature ranged from 99 to 103. When first seen by Dr. Brown on April 28, the patient presented evidences of septic infection. The perineal wound was gaping and covered with a grayish exudate. Pelvic examination showed the uterus to be freely movable and not tender. Involution had advanced until the fundus could hardly be felt above the symphysis. The lochia was scant, without odor and mucopurulent in character. On the left wall of the pelvis somewhat above the ischial spine was an area of edema which was tender to the touch. A pyelophlebitis was suspected and conservative treatment including rest, fresh air, etc., was advised. For thirty-six hours the temperature was normal or below, after which the woman had a chill and the temperature went up to 103.8. She was removed to the hospital on May 1. A blood examination showed the following: hemoglobin, 100 per cent., white cells 6700, polymorphonuclear leukocytes 76 per cent., lymphocytes, 23 per cent., eosinophiles 1 per cent. A vaginal smear showed the presence of a diplococcus. Subsequent blood cultures were negative. The temperature had a daily range of from 5 to 6 degrees but there were no rigors until May 6,

when after a chill the temperature rose to 106 in six hours and then dropped to 97.6 the next morning. At noon the next day she had another chill and the temperature subsequently rose to 106.6. There was no abdominal rigidity or tenderness except a slight soreness on deep palpation on the left side low down and on bimanual examination a small mass was felt to the left of the uterus and high up. A diagnosis of left spermatic thrombophlebitis was made and an immediate operation advised. The abdomen was opened through the left rectus muscle and the peritoneal cavity found free from adhesions or other evidences of peritonitis. The appendix and the right side of the pelvis were normal. The left tube, ovary, broad ligament and even the peritoneum covering the left horn of the uterus were very edematous. From the base of the broad ligament there extended up over the brim of the pelvis a densely thrombosed vein. This thrombus extended nearly to where the vein passed over the sigmoid.

A heavy chromic gut ligature was passed under the vein well above the end of the clot and tied. The edematous tube and ovary were removed and a large sized cigarette drain put through a stab wound of the left flank, being carried down to the infected vein and stump of the broad ligament. The patient improved immediately and left the hospital three weeks after the operation.

The second case was a primipara, twenty-nine years of age, who went through her pregnancy without any special discomfort aside from occasional vomiting. She went through a normal labor and a slight perineal laceration which resulted, was repaired and united perfectly. About two weeks after delivery she was seen by Dr. Brown who found her with a temperature of 105.2 and pulse 130. The abdomen was relaxed and there was no tenderness except in the region of the left ovary where there was a mass about as large as a golf ball which felt hard and firm on pressure. Vaginal examination showed an entire absence of lochial discharge. The uterus was well involuted, freely movable and not tender. Operation was advised for the removal of a possible pus tube or the ligation of a phlebotic vein. On opening the abdomen, the condition found was the same as that in the previous case. The right side of the pelvis was perfectly normal but the left ovary was large and edematous and a mass of thrombosed veins extended upward from the base of the broad ligament. The involved veins were ligated and part removed. The ovary and tube were likewise tied off and excised and drainage tubes inserted. At the time of the report the patient was still in the hospital and the result was doubtful.

DISCUSSION.

DR. S. J. DRUSKIN, New York.—I regret that Dr. Brown did not discuss the relation of thrombus formation to thrombophlebitis. Is thrombosis due to infection or is thrombophlebitis secondary to an infected thrombus? Views on this point still differ. Now let us examine a few uteri, infected and uninfected specimens, note the findings, and see what conclusions we may

derive therefrom. After delivery you will find the small and large blood-vessels filled with blood clots. These clots are separated from the vessel wall by a moderate amount of leukocytes. The thrombi are present only in the inner muscle layer of the uterus. If you next examine a recently infected uterus you will note the same findings, plus the presence of microorganisms extending from the mucosa along the blood clot and a greater amount of infiltration. If you next study a uterus showing an advanced degree of infection, you will note a softening of the blood clot and probably an extension of the thrombus into the middle or outer coat, but not beyond that.

If you examine the placental site still further, you will find the internal layer of muscle loosened and the fibers split up. This is due to the penetration of the placental elements into the uterine substance. Even the blood-vessels show injury to their muscular coats and hyaline degeneration due to erosion by the chorionic elements. The latter changes can be found in the uterus during pregnancy as well as after delivery. Nevertheless, clotting or thrombosis does not occur during pregnancy but only after delivery. This is because the outer and middle coats of the uterus which remain intact, contract firmly after delivery and expel the blood out of the blood channels situated there. But the inner layer of muscle has lost its contractibility and fails to act. The blood remains there, stagnates and clots. Thrombosis is due neither to injury to the blood-vessels nor to infection, but rather to disturbed circulation. The infected thrombus does not differ in its essentials from the noninfected thrombus.

The analogy can be carried to other locations, the pelvic veins and the femoral veins. In thrombosis of the pelvic veins the symptoms are slight and are overlooked until infection has occurred. In the femoral veins, swelling and pain attract attention.

To overcome the lowered circulation following operation, and thus guard against the formation of thrombi and emboli, surgeons both here and abroad, have adopted the early getting out of bed after operation. Notably, among those in favor of the early getting out of bed are Dr. Boldt of New York, and the Drs. Mayo of Rochester. I have adopted the same procedure in obstetric practice, and for the past year and a half, patients on Dr. Ratnoff's service at the Jewish Maternity Hospital as well as my own, have been allowed to get out of bed on the third and fourth day after delivery. We are thoroughly satisfied with the results and we have never had occasion to regret our practice. The patients feel better, the bladder and intestines functionate better and retroversions are less likely to occur. Our material is too small to draw conclusions from the influence of early getting out of bed upon thrombus formation. The figures of Dr. Jaschke of Düsseldorf are, however, noteworthy. He reports 2500 cases that got out of bed late in the lying-in period, with four cases of thrombosis and one case of embolus, and over 2500 cases that were permitted to get out of bed early, without a single case of thrombosis or embolus. Dr. Klein reporting 10,000

cases of each series from Wertheim's clinic, points out almost equally striking differences. I have personally observed at the Clinic Wertheim the beneficial results of getting out of bed early.

DR. W. M. BROWN, Rochester.—“I have no intention to go into the details of the etiology of the conditions of thrombophlebitis, as my paper was intended entirely for stimulating the discussion on the question of surgical treatment. I forgot to mention that in the last case, just as I was leaving home, I got a report over the telephone from the bacteriologist that the section of vein that was removed showed a growth of streptococci. I agree very heartily in the suggestion of moving patients around and getting them up early. We have been told that one of the chief factors in the cause of thrombophlebitis is the slowing of the blood current and I am endeavoring now to get all my patients in a semi-sitting posture at least from the first day. I roll them around and insist on their turning from either side and turning over on their faces during the first twenty-four hours and at all times, thus promoting drainage, the early restoration of the uterine involution and also favoring the circulation.”

DR. RALEIGH R. HUGGINS, of Pittsburg, Pa., read by invitation a paper on

A CONSIDERATION OF SOME METHODS IN THE TREATMENT OF PUERPERAL INFECTIONS WHICH HAVE GIVEN IMPORTANT RESULTS.

Dr. Huggins said that it was unfortunate that we are not able to demonstrate the same relative advance in the differential diagnosis and treatment of infection following delivery that is so clearly demonstrated in the progress which has been made in the field of operative obstetrics. Many and varied have been the methods advised in the local treatment of the interior of the uterus. Gradually we are learning that if the local treatment is not too meddlesome an exact diagnosis may not be an absolute necessity, so far as the recovery of the patient is concerned, but that many patients may be saved, who otherwise die, if proper care is exercised early in the course of every case of puerperal infection. A patient with symptoms of infection, following delivery, presents a number of conditions for analysis. There may be an almost infinite series of gradations from a slight infection arising from lacerations, to an inflammatory process involving the uterus, tubes, parametrium, lymphatics, and ovaries or extending beyond these into the blood stream resulting in a general systemic infection. Early diagnosis of the local lesion is important, because improper treatment may serve only to augment the spread of infection onward into the blood stream thus converting what might remain a local process into a widespread infection. The infection usually starts in the uterus and the primary lesion is a wound infection of the placental site. It is here we have an ideal culture medium for the propagation of organisms easily and not infrequently introduced from without.

Pathologically speaking it is divided into two varieties: the putrid and septic. The former is caused by the simple putrefactive organisms

or the ordinary pus organisms of lesser virulence and remains more or less limited to the endometrium. Sections through the wall of the uterus thus infected show a thick layer of necrotic material lining the uterine cavity. In the superficial layer of this membrane large numbers of the offending organisms are found. Beneath this layer of necrotic material lies a thick layer of small cell infiltration or the so-called zone of reaction.

Few of the organisms can be found in the reaction zone and none can be made out in the healthy tissue beneath. (Bumm.) Nature's method of preventing invasion is thus beautifully illustrated and does not differ here from all other parts of the body. In the septic variety this small cell infiltration may be absent or imperfectly developed and microorganisms can be seen making their way downward along the line of the lymphatics through the muscle wall out toward the peritoneal covering. Good knowledge of the pathology serves us well because it is from a keen appreciation of this fact that much of the progress made in the treatment of puerperal infection has been based. If the zone of reaction is removed by operative measures, the chances of the infection spreading are much greater than if the uterus is left undisturbed. If streptococci of the hemolytic type are present in the uterus they may pass directly through the wall of the uterus in spite of any barriers and without local reaction. Local treatment which is done with the idea of cleaning out the uterus removes what little defense there may be and will only expedite the spread. We have learned that this form of infection cannot be checked in its onslaught by any kind of intrauterine treatment. The writer, as many others, was slow in appreciating the analogy between an open wound in the uterus and one in other parts of the body. A disposition to ignore the inside of the uterus has been cultivated and the results have been much better than when vigorous measures were employed to empty or irrigate the uterine cavity with various antiseptic solutions. The almost regular occurrence of chills and elevation of temperature following the employment of various intrauterine manipulations finally led us to the conclusion that little benefit was derived and that often much harm was done.

It was learned that a firmly contracted uterus is of as much value in the prevention of the spread of infection as it is in the prevention of hemorrhage.

One hundred and twenty-five cases of infection following abortion after the second month, or delivery, have all been treated in a conservative manner as far as the inside of the uterus is concerned, with the exception that where firm contraction of the uterus was not present or where it could not be secured by the use of strychnin, ergot, or pituitrin the uterine cavity was firmly packed with iodoform gauze. This has been done for the purpose of securing firm contraction and incidentally if the uterus has not been emptied facilitating the expulsion of the contents. Both morbidity and mortality have been less than formerly when the measures were more active; that is immediate cleaning out of the uterine contents. In the treatment of abortion at or before the second month the uterus is emptied at once

without the same regard to the danger of systemic infection. Here the infected area is not large and contraction of the uterus is best secured by freeing the cavity of all débris.

In this series streptococci have been recovered from the uterus in 50 per cent. of the cases. A hemolytic streptococcus has been present thirty times but the test for hemolysis was not always made. Blood cultures were positive in thirty cases. There were three deaths. One patient was admitted ten days after the onset of symptoms with a complicating pneumonia. The second was complicated by a general peritonitis and the third had a very low resistance as a result of profuse hemorrhage.

We learned that the presence of the most virulent bacteria in the uterus does not necessarily mean that the infection will spread. Also do we conclude that it is less likely to spread if the uterus is well contracted. While the methods used have been termed conservative there is one feature of the treatment that may be considered somewhat radical and that is the employment of gauze packing in the uterus where contraction or retraction is not present or secured by the use of drugs. This is done in septic abortion before the expulsion of the ovum, always excluding the possibility of perforating injury to the uterus. The same thing is done after expulsion of the ovum in the presence of retained placenta. If there is hemorrhage the same method is employed. Unless there is hemorrhage or relaxation of the uterus no local measures are used. If either of the above conditions is present and does not respond at once to pituitrin or ergot the uterus is firmly packed with iodoform gauze. The presence of local infection beyond the uterus within the tubes or parametrium contraindicates the employment of gauze. We have learned that a firm tampon does not increase the danger of spreading the infection but on the contrary retards it.

There is certainly no fear of damming back the infection and thus permitting greater absorption. If the tampon is used it is removed at the end of twenty-four hours. If there is still reason to believe that foreign material remains in the uterus and it does not remain in the state of firm contraction the gauze pack is again introduced without fear of harm. If the infection has not extended beyond the cavity of the uterus the temperature in the majority of instances falls rapidly to the normal. If retained secundines are present, they may be expelled, or if not, the activity of the infection subsides, so that in a few days they are easily removed without severe reaction. Knowledge of the presence of hemolytic streptococci within the uterus does not assist either diagnosis or prognosis. Our experience corresponds with others who report that the streptococcus is found in the uterus in more than half of all cases of puerperal infection both mild and severe. This being true our treatment must be a rational one. That means a careful preservation of the natural forces of resistance. If the protective zone is removed it may allow a spread of the infection where otherwise it would be confined to the uterus. Patients are placed in the sitting position to assist drainage.

When infection spreads beyond the uterus attention should be

paid to the lymphatics of the pelvis. The majority of exudates disappear spontaneously yet many suppurate and when this occurs drainage should be instituted as early as the condition can be recognized. This is true particularly when it ascends and pus collections form in the retroperitoneal space. There is no region in the body which demands earlier drainage in the course of infection than does this one. Hysterectomy is indicated when the infective process spreads in the form of multiple abscesses in the uterine walls or when a putrid endometritis causes a degeneration of myomatous growths within the uterus. Suppurative peritonitis should be operated upon early and the cavity thoroughly drained.

All patients with chronic thrombophlebitis drifting on day after day from bad to worse should be operated upon. This is true particularly when the infection involves the ovarian veins. My experience leads me to be enthusiastic over the hope that lies in the operative treatment of some of these cases if undertaken early and proper judgment used in the operative technic.

The treatment of puerperal septicemia or bacteremia has been one of great interest. The employment of vaccines, sera, and various kinds of chemicals intravenously has been tried with uncertain results. The satisfactory results obtained from the use of magnesia sulphate locally in the treatment of erysipelas and various other forms of infection led the writer to try it in the treatment of puerperal infection. After experiments had proven its safety it was given intravenously and in many instances the results have been most satisfactory; at first it was given in a 1 per cent. solution of saline and not more than 30 grains at one time. Later it was learned that much greater quantities of the drug can be given with safety if administered slowly. We have never given more than 100 grains of it at one time in a solution of 1 per cent., but Dr. Harrar has used 250 grains with no alarming effects. At the suggestion of Dr. Harrar distilled water has been used instead of saline and there have been fewer chills following the administration. Chills are less liable to occur if the fluid is given at the proper temperature. There have been no accidents from its use and we have given it more than 150 times. It has been repeated several times in the treatment of the same patient at twenty-four hour intervals. Experiments have not explained its action. It is not bactericidal, yet in certain instances the effect is so marked that one is inclined to the belief that in some way the tissues are stimulated to greater resistance. Whether agglutination of the bacteria occurs as a result of its presence, or the production of opsonins increased remains unknown. It has been given in the treatment of twenty-five cases of streptococcemia with two deaths. Some of these patients were extremely ill and blood cultures showed the presence of the hemolytic variety of the streptococcus. It has been of undoubted value when administered in the acute stage of streptococcic toxemia before it has been possible to demonstrate the presence of bacteria in the blood stream and when we are unable to decide what the final extent of the infection may be. Its use intravenously in pneumococcic and other forms of

streptococcic blood stream infection have not met with the same success. This leads one to be doubtful about its value in this form of infection and after all is said the effects noted in so small a number of cases may only be a coincidence.

To summarize: The most rational treatment in the beginning of every case of sepsis starting within the uterus is based upon a keen appreciation of the pathology. The first and most important indication is to secure firm contraction of the uterus, the second is a healthy respect for nature's protective zone; in this way limiting the spread of infection. Good drainage is also an important factor and is secured by placing the patient in the sitting position. In addition to general measures such as attention to diet and elimination, fresh air is the most important factor in the successful treatment of puerperal infection. These patients should be kept in the open air winter and summer.

DISCUSSION.

DR. JAMES A. HARRAR, New York.—“The statements of Dr. Huggins are so clearly in accord with the modern teachings concerning the treatment of puerperal infection, that there is very little to add and certainly nothing to criticise. The elimination of the postpartum douche in normal labor, and in fact of all douching and curetting in infected cases, has undoubtedly been one of the greatest factors in our modern reduction of material mortality and morbidity. The isolation of the offending organism from the interior of the uterus is always interesting, but it is questionable if such information is of much value in directing our treatment. What is important is to determine as early as possible whether or not we are dealing with a blood stream infection, *i.e.*, with a true bacteremia, for we now seem to have a treatment that is of some value in these cases if we can institute it early, before the localization of the infection in secondary abscesses. Dr. Huggins advocated this method originally four years ago, *i.e.*, the intravenous injection of hypotonic solutions of magnesium sulphate. In some way this increases the patient's resistance, perhaps by increasing the phagocytic activity of the leukocytes. I have used this 2 per cent. solution of magnesium sulphate in freshly distilled water in a large number of cases of streptococcic toxemia with excellent results and also in twelve cases of streptococemia, proved such by repeated blood cultures. Dr. Huggins has been extremely fortunate in securing such a large series of bacteremias in which to test out the method, and his results have been extraordinary. In the Lying-In Hospital, where we handle over 5000 puerpera in a year, including many infected women sent in by midwives and doctors, in three years we have met with but twelve cases of true bacteremia in which we have been able to use magnesium sulphate.

That bacteremia is more often suspected clinically than is proved by culture, has been demonstrated by our former pathologist, Dr. J. E. Welsh. In 176 cases referred to him for blood culture, he se-

cured positive growths in but 46. Now to show how desperate the condition is when we have bacteria in the blood: in these 46 cases of streptococcic bacteremia, under ordinary methods of treatment, 3 recovered, and 43 died. In the 12 cases since then, in which we have been able to use magnesium sulphate, the results have been as follows: three cases were admitted to the hospital late in the course of an acute pyemia with multiple abscess formation and died within a few hours after a single infusion given as a last resort. Three more were admitted, also bacteremias, with such complications as peritonitis, panophthalmitis, and septic emboli in the pons. They died after three or more injections, with only temporary improvement. Six women with streptococci in the blood recovered. Some of these developed secondary abscess formation later in the course of their convalescence but with their increased resistance were able to take care of their infection. Four of these were admitted desperately ill and in a low typhoid state. They were of the type in which heretofore the prognosis has been quite hopeless. The other two, while they ran high temperatures, did not give the impression of being very sick at any time.

So much for the known value of magnesium sulphate and as Dr. Huggins admits, the reported cases are but few.

Now as to the dangers of these infusions. There are of course the ordinary dangers of giving an intravenous infusion. The aseptic technic must be perfect. Then there is danger in using an infusion in any case of extensive thrombophlebitis, as embolism may be produced by the breaking off of a portion of the thrombus with the increased bulk of the blood volume. Dr. Meltzer of this city, warns against the depression of the respiratory centers by magnesium sulphate, but in considerably over a hundred of these injections I have not seen any toxic effect, provided the injection is given very slowly.

We should not leave the subject of bacteremia without a word of caution as to the importance of care in taking the blood cultures. It is the easiest thing in the world for contamination to occur and a very great responsibility rests upon the bacteriologist in making a positive diagnosis."

DR. J. S. DRUSKIN.—I should like, to ask the doctor if he does not think that a great deal of the beneficial results he gets with the magnesium sulphate solution is due to the large amounts of water he injects. It has been proved experimentally that parenchymatous degeneration in the organs of infected animals can be retarded if large amounts of fluid are administered to them. I should also have liked to cite if time permitted, my experience with the intravenous use of colloidal copper in puerperal sepsis and get the opinion of the members of the section.

DR. QUIGLEY, Rochester, N. Y.—"I have not had a chance to use the sulphate of magnesia but I will do so as soon as the opportunity offers. I would, however, like to make a plea for fewer vaginal examinations. That is not a new story of course, but I believe having once made a definite diagnosis as to the position and

ascertained the engagement, that the further progress of the case can be determined as readily by rectal examination, as by vaginal. The dilatation of the cervix, and the engagement can easily be determined, and in fact most everything, except the position. I do not believe you can feel the sutures. I see no particular use in invading the uterus in a suspected case of infection, provided it is a case that you are sure that the secundines are all removed, except of course, for the purpose of making a culture. Another slight detail regarding efficient drainage followed by both Dr. Brown and myself, is the custom of having our patients turn on their face for a few minutes every day."

TRANSACTIONS OF THE AMERICAN GYNECOLOGICAL SOCIETY

*Thirty-ninth Annual Meeting, Held at Boston, Mass.,
May 19, 20, and 21, 1914.*

*The President, J. WHITRIDGE WILLIAMS, M. D. of Baltimore,
in the Chair.*

SPINAL ANESTHESIA IN GYNECOLOGY.

DR. GEORGE GELLHORN, of St. Louis, Mo., said the severity of an operation stood in direct proportion to the amount of ether inhaled. The popular ether drop method was not as safe a procedure as would appear from existing statistics. The latter were incomplete in regard to the number of fatalities and did not take into consideration late complications which might either lead to death or seriously interfere with convalescence. There should not be any one routine method, but the needs of the individual case must govern the choice of the mode of anesthesia. In gynecological work, spinal anesthesia offered particular advantages and showed most impressive results.

The mortality rate from spinal anesthesia could not be determined by statistics. These were unreliable. The majority of deaths occurred during the experimental stages of the method. The anesthetic itself seemed to have had nothing to do with the mortality. Stovain, tropococain, and novocain were more or less equivalent. His experience was limited to the last-named drug.

The safety of spinal anesthesia depended, first and foremost, upon its accurate technic, and the strictest observance of even the minutest detail was of paramount importance. Reports of deaths must, therefore, contain all details of the technic employed before they could be admitted to serious consideration. It had been proven in thousands of cases that by a painstaking technic not only death, but also collapse and other alarming complications of earlier days could successfully be avoided. Contrary to popular prejudice, there was no psychic trauma connected with spinal anesthesia. Nausea and vomiting during operation were reduced to a minimum

or altogether absent. The abdominal walls were fully relaxed, and the intestines remained quietly within the peritoneal cavity. Therefore, all operative manipulations were rendered easier, and the brusque handling of the viscera was obviated. All this tended to lessen the operative shock, and as nerve impulses did not reach the brain, spinal anesthesia was the ideal measure of anoci-association. In a certain small percentage, analgesia was incomplete; then a few whiffs of ether sufficed to render the operation painless.

In a list of 127 abdominal and 47 vaginal operations, he showed that every kind of gynecological operation, including those on the kidney, could be performed under spinal anesthesia. There had been no death from the method. In all four patients died, two from sepsis after radical operations for cancer of the cervix.

The postoperative care of spinal anesthesia cases was strikingly easy. The usual postoperative symptoms appeared in greatly mitigated form, or were absent altogether. Patients who had had personal experience with ether and spinal anesthesia declared themselves in favor of the latter. An annoying and comparatively frequent by-effect was headache which, however, yielded spontaneously or to bromides, and constituted no danger to the patient. Other by-effects, such as backache, paresthesias, and temporary paralysis seemed to have become less frequent with improvements in technic, and it was the consensus of all observers that lasting ill effects were conspicuously absent. Spinal anesthesia markedly lessened the blood pressure and should therefore be used with caution in cases of pronounced hypotension. Acetonuria occurred after spinal anesthesia, as well as after inhalation narcosis, but exerted no deleterious effect upon the patient; it disappeared spontaneously about five days after operation.

Spinal anesthesia enabled the surgeon to operate with safety on patients in whom ether would be contraindicated. It was chiefly applicable in cases where the seriousness of the affection, the magnitude of the operation, or coexisting complications (cardiac and pulmonary lesions, nephritis, diabetes, hyperthyroidism, advanced age, debility) constituted a particular risk. Minor operations should be reserved for ether narcosis. Spinal anesthesia was contraindicated in kyphoscoliosis and other marked anomalies of the spinal column, diseases of the central nervous system, profound shock, or marked hypotension from other causes; sepsis, and fevers of unknown origin. Furthermore, in neuropathic individuals, where there was a strong prejudice against the method. Suppurations and eruptions near the desired site of injection forbade the use of spinal anesthesia until aseptic conditions could be established.

DISCUSSION.

DR. FREEMAN ALLEN, of Boston, said that his experience with spinal anesthesia included very few gynecological cases, and was chiefly confined to cases of genitourinary surgery and general surgery. While he was not an ardent advocate of spinal anesthesia in certain cases, yet as a professional anesthetist he felt called upon to say a word in defending ether. He thought that a great deal of the

condemnation that ether had been receiving lately was due to the fact that surgeons and patients had been the victims of unskilful administration of ether. There was a radical difference between an ether anesthesia administered by a skilful professional and one carried on by a person of small experience. He thought that surgeons were much too apt to put up with administration of ether by persons who were comparatively unskilful and then blame the ether anesthesia in general. They were apt to accept as inevitable the statement of the person administering the anesthetic that the patient was too difficult to control by ether, had not been properly prepared, and was a poor subject for ether, etc. However, if he were a surgeon and lived in a community where the services of a really skilled anesthetist were not obtainable, he should certainly use spinal anesthesia very largely, if not exclusively. It was a wonderful form of anesthesia, producing results often so utterly satisfactory as to make one believe that the ideal anesthetic had been found at last. Nothing could be more perfect from the viewpoint of the patient, of the surgeon and the anesthetist than the course of an operation under spinal anesthesia when it worked well. There was no psychic shock whatever when a patient had been properly prepared for spinal anesthesia and properly handled during the same. The only psychic disturbance in evidence was that of the surgeon and his assistants if they were unused to operating under this form of anesthesia. It was important to leave a patient under spinal anesthesia alone just as much as possible. Perhaps the most striking advantage to the surgeon was seen in laparotomies, especially in acute peritoneal conditions, where the absolute relaxation of the abdominal walls and the flaccidity of the intestines was greater than that seen in profound chloroform anesthesia and far exceeded anything that could be produced by ether.

An operation properly conducted under a perfectly working spinal anesthesia fulfilled all the indications of Crile's and Lower's admirable anoci-association work, except possibly in the period of post-operative analgesia produced by quinin and urea which could easily be used as an adjunct to spinal anesthesia. There could be no doubt of the extreme value of this method in any form of surgery. It certainly had a distinct and increasing field of usefulness in surgery.

His own cases at present numbered 453, only 143 more than at his last report read at Atlantic City in June, 1912. But the use of this method since its introduction by him to this community in the autumn of 1910 had become thoroughly general. It was, for example, used almost as a routine by the genito-urinary service at the Massachusetts General Hospital, and largely in private practice of gentlemen connected with this service. It was also frequently administered and had been for the past two years by the resident surgeons of the Massachusetts General Hospital in emergencies and railroad injuries, acute peritoneal conditions, like strangulated hernia, acute intestinal obstruction, etc.

DR. JOHN O. POLAK, of Brooklyn, New York, reported two cases of very prompt and aggravated shock coming on from the immediate use of the Fowler position after abdominal operations for general

peritonitis where a stab-wound incision was made and drainage instituted. It had been his custom to have his patients placed in a horizontal position or a moderate Trendelenburg position for the first few hours to combat the point Dr. Gatch made of the effect of posture. He got these two cases up in the Fowler position and in coming out of the anesthesia both were in the most severe shock as the result of it, and only by change of posture was the shock relieved.

In regard to spinal anesthesia, during the last few years he had used it in a number of cardiac cases, cases of tuberculosis, diabetes, and in those in which he had had to do gynecological or obstetrical operations. In those extremely severe cardiac cases that complicated pregnancy the use of spinal anesthesia had brought to him a new era of obstetric surgery in this way; all had the same difficulties in these cases, particularly advanced pregnancy with marked decompensation of the heart, and where delivery had to be accomplished by vaginal Cesarean section. By the use of such anesthesia the whole picture had been changed. There was the advantage of blood-letting without any of the depressing effects of the anesthesia, particularly struggling and signs of cyanosis, etc., and the effects had been most admirable. In cases of tuberculosis in which the uterus had to be emptied he had used it in fifteen or twenty cases during the last year.

In the field of gynecological and obstetrical surgery, in cases where it was dangerous to give general anesthesia, he firmly believed that ether was better in most of these cases than gas-oxygen, where there was any decompensation of the heart because of the cyanosis and struggling produced always in the administration of gas, and that spinal anesthesia preceded by the proper administration of morphia and bromides to produce narcosis, or in cases where the cardiac condition was such that one did not care to risk the depressing effects of veronal and bromides, by preceding the anesthesia by morphia we got excellent results.

DR. SETH C. GORDON, of Portland, Maine, said that he had endeavored to keep up with the profession as far as possible. He had given ether and chloroform for fifty-eight years, almost for four years in the army during the Civil War. In the Department of the Gulf in the southwest they used chloroform altogether. He had never seen but one death from chloroform, and that was in the case of a man who was wounded in the middle finger. He had no suffering when he took the chloroform. The result was that when the speaker got ready to operate, in ten minutes the patient was dead. Since his return from the army he had never used anything but ether in an experience embracing twenty-five years in a general hospital. He had never seen but one death which in his opinion was traceable to ether. A patient came who had a severe bronchitis, and he supposed she had partially recovered from it. He gave her ether, did an abdominal operation, but she died from pneumonia.

DR. M. L. HARRIS, of Chicago, said it was not entirely a question of deaths following anesthesia, but one of comfort to the patient during and subsequent to the anesthetic. If one gave ether in all cases and had them all recover from the ether, it would not help the

profession with the after effects of the agent, as they would be just the same.

Under nerve blocking there had been no deaths *per se*, so it was perfectly safe from that standpoint. He had had occasion to operate on a number of patients who had undergone previous operations under general anesthesia, and without a single exception the patients had expressed themselves as infinitely preferring nerve blocking and would never think of taking a general anesthetic again.

In the 234 operations which he reported, not a single patient had had any lung complication whatever; sixty-six of them were laparotomies, and in those he found a large percentage of post-operative lung complications. Laying aside entirely the question of deaths, nerve blocking still possessed such distinct advantages that the profession would have to use it. There was a big difference in central spinal canal anesthesia and in nerve blocking, as one was a distinct peripheral blocking in all cases, while the other possessed the principle of blocking all centers, and blocking all centers was a serious proposition. This was why so many of these patients had serious depression due to the fluid reaching the higher spinal centers, but limited at any level it would be ideal. Until some way was found of limiting it to a distinct level or to a certain part of the cord, he thought peripheral anesthesia or nerve blocking must have certain advantages over intraspinal anesthesia.

DR. GEORGE GELHORN, of St Louis, in closing the discussion, said that his remarks pertained particularly to gynecological operations. He had never done anything but such operations under spinal anesthesia, but he was certain that in operations upon the extremities, nerve blocking would be the anesthesia of the future.

While he did not oppose the use of ether as an anesthetic, he thought that spinal anesthesia was better.

EFFICIENCY STUDIES IN GYNECOLOGICAL DIAGNOSIS.

DR. ROBERT L. DICKINSON, of Brooklyn, New York, stated that many of the methods of Taylor's "Scientific Management" of factories were adaptable to office, dispensary, and hospital group diagnosis. He pointed out how all processes could be standardized, then reduced to writing, instruction carried on, then constant inspection to check up everyone's results, while studies of time and waste motion in the operating room and ward were undertaken.

Attention was directed to the need of systematic study of fatigue among nurses, as had been done in other occupations. Reference was made to cooperative methods as instanced in the Associated Out-Patient Clinics of New York; of the Hospital Efficiency Committee, of the Philadelphia County Medical Society representing fifty-five hospitals, of the great new Mayo Building just opened, and in associations of groups in cities. Some examples of printed forms were submitted, such as a full preliminary history to be made out by the patient herself, and also printed directions to gynecological and pregnant patients.

A STUDY OF HOSPITAL EFFICIENCY WITH PARTICULAR REFERENCE
TO PRODUCT RATHER THAN EXPENDITURE.

DR. E. A. CODMAN, of Boston (by invitation) stated that at present the trustees of hospitals gave attention to the efficiency of their institutions in expenditures, but they had made little or no effort to find out whether the treatment of the patients, which was given by their medical and surgical staffs, was good or bad. It had been taken for granted that the public preferred to be treated by a physician or surgeon who had a great reputation, even if he was hurried or careless, than by an individual of lesser reputation who could afford the time and pains necessary to obtain a good result in the treatment of the disease which afflicted the patient. Hospitals in which promotion was made by a seniority system could not help tending to the inevitable practice of allowing the more capable surgeons to do the easier and more brilliant cases, while the more tedious, difficult and grave cases might be referred to the younger men whose private reputations made little demand upon their time. There seemed to be some ground for the contention that it would be better to have the young surgeon do a large number of easy operations so that when he was older his experience might benefit the more difficult cases which fortunately were much fewer in number.

The value of the "End Result System" was tending to bring this change about.

HAS THE AMERICAN GYNECOLOGICAL SOCIETY DONE ITS PART IN THE
ADVANCEMENT OF OBSTETRICAL KNOWLEDGE?

DR. J. WHITRIDGE WILLIAMS, of Baltimore, selected this title for the subject of his presidential address. After referring feelingly to the deaths of Dr. William H. Wathen, Dr. Henry J. Garrigues, and Professor Ottavio Morisani, he gave an analysis of 1010 papers which had been contributed to the Society during the thirty-eight years of its existence. Of this number there were 664 upon gynecological and 346 upon obstetrical topics, including extrauterine pregnancy.

He found the task of reading the articles very interesting and very profitable, as they set forth in a more or less consecutive manner the history of obstetrics for the past forty years and served to impress him anew with the great progress which had been made in the technical side of the art.

During this period many changes had been witnessed, the most far-reaching being the development of aseptic technic and the establishment of the bacterial origin of puerperal infection, as the result of which the lying-in hospital had been converted from the most dangerous to the safest place for the delivery of women. Every stage in the development of this doctrine could be traced in the *Transactions*.

The conversion of Cesarean section from the most dangerous operation in surgery to one whose results were so good that it was in

imminent danger of being abused by "knife-loving" obstetricians, and by surgeons who knew nothing of the resources of obstetrics, could be graphically followed. The early accounts of tardy operations for the removal of a dead child from an exhausted and infected woman stood in marked contrast to the first elective operation performed by Lusk in 1887, but particularly to the long series of successful operations which were afterward reported by many of the Fellows.

One of the most interesting phases of obstetrical history was afforded by the fifty-one papers upon extrauterine pregnancy. In these one could trace the evolution of a pathological curiosity into a condition of every-day occurrence.

We could also follow the evolution of more correct views concerning the employment of forceps, and the recognition that its improper use was a potent factor in the death of the child and in the production of serious lesions on the part of the mother. Likewise one could read the discussions concerning the value of axis-traction; but just as its merits were beginning to be recognized, its field of usefulness became markedly restricted by the knowledge that it was not the ideal means of overcoming mechanical obstructions.

For purposes of analysis Dr. Williams classified the 346 obstetrical papers into thirty-two groups and presented them in tabular form.

One of the most important factors in the lack of productivity was to be found in the system of medical education. Until very recently university ideals were entirely lacking in the medical schools, and even now in many institutions affiliated with universities the connection was purely nominal. How many who held professorships could truthfully say that we were held to the same accountability as the heads of the true university departments, or were expected to justify their existence by an occasional contribution to science. Did not we, and the authorities as well, consider that our obligations had been satisfactorily fulfilled if we taught a few hours each week, gave decent care to the patients under our charge, and once or twice a year wrote a practical paper so that our professional friends might know that we were still alive? We must admit the indictment, but the fault was not altogether ours, for he thought that not much more could be expected of us until the universities awoke to the fact that medical education was a serious undertaking and was the most costly of all forms of instruction.

How many obstetrical departments were provided with proper accommodations for a sufficient number of patients for the instruction of students, with adequately paid and enthusiastic assistants, or with suitably equipped laboratories for research work, not to mention a salary for the director in any way commensurate for the ability and effort necessary to supervise the work in anything like an ideal manner? Real university departments were just beginning to be organized in some other branches of medicine, but he knew of none in gynecology or obstetrics.

From extensive investigation he knew that in most of the schools obstetrics was the least well cared for department, and must ordi-

narily be content with what was not wanted by others, while the professor was frequently regarded by his colleagues as being engaged in an almost unworthy pursuit. No doubt some professors were poorly trained and fulfilled their obligations lightly, but he knew many who took them seriously and who felt depressed whenever they considered the status of their department and their inability to do better work. So long as such conditions existed it was scarcely conceivable that many professors would be scientifically productive or would often be able to induce promising young men to devote themselves seriously to this branch of medicine, for the few men in this country who were really doing their duty did so with great personal sacrifice and against odds with which they should not have to contend.

A third reason for the low state of American obstetrics was that this was the only country in the civilized world in which obstetrics and gynecology were sharply divided, and he might add that this was the only important gynecological society in which the majority of the members took no interest in obstetrical problems, or in which it could happen that a member on arising to discuss a paper would preface his remarks by stating that he knew nothing of obstetrics and then would go on to make trivial remarks.

Time would not permit him to discuss this phase of the subject at length, but he knew that in this country neither gynecology nor obstetrics would take its proper place until a body of men had been developed who would be interested in and devote themselves to the study of the problems connected with the entire sexual life of women. He hoped he might live to see the day when the term obstetrician shall have disappeared and when all teachers, at length, would unite in fostering a broader gynecology instead of being divided as at present into knife-loving gynecologists and equally narrow-minded obstetricians, who were frequently little more than trained man-midwives.

While it was debatable whether a union of gynecology and obstetrics was feasible for those engaged in private practice, or would materially improve matters in most medical schools as at present organized, there was no doubt in his mind that the professorial chairs in the university medical schools needed to be filled by broadly trained scientific men, who were prepared to give their time to their duty. Such a development was scarcely to be expected until the universities were prepared to equip and maintain women's clinics somewhat similar to the Frauenkliniks of Germany, but more liberally provided with laboratories for the anatomical, chemical, pathological and physiological investigation of gynecological and obstetrical problems. In this event the director must be an accomplished scientific man and in addition to being a competent clinician, who would devote the major portion of his time to the conduct of his department. If he be of the proper type this would evolve no sacrifice; but if he were not, he would be unhappy no matter how great the emoluments may be. Institutions of this character would also require the services of a large staff of well-trained and enthu-

siastic assistants, but would be able to make little use of the short term intern who desired only a snatching of learning. Large endowment or state aid would be necessary for the support of such institutions, but he could conceive of no better expenditure of funds if it led to a fuller knowledge of the many unsolved problems connected with women and to the development of a body of men competent to undertake their investigation.

He expressed the hope of seeing a number of such institutions scattered over the land, and then no future president of this or any other society would be able to say that its members had not done their part in the advancement of obstetrical or gynecological knowledge. We had heard from others of "the passing of a specialty," but he felt that there was a glorious future for the broader gynecology, which was as yet scarcely in its infancy, and the members of the society should do what they could to advance it.

DR. REUBEN PETERSON, of Ann Arbor, Michigan, read a paper entitled

"A CRITICAL REVIEW OF 500 PUBLISHED AND UNPUBLISHED CASES OF ABDOMINAL CESAREAN SECTION FOR ECLAMPSIA."*

MECHANICAL PRINCIPLES INVOLVED IN THE CAUSE OF BACKWARD AND DOWNWARD DISPLACEMENTS OF THE UTERUS.

DR. GEORGE H. NOBLE, of Atlanta, Georgia, reviewed the arrangement and anatomy of the supports of the organs contained within the pelvis. After speaking of the effects of pressure upon the ligaments of the uterus in ordinary circumstances, he directed attention to the consideration of cases having their beginning in lesions of the floor of the pelvis.

He said the perineum might be likened to a center stone in an inverted arch, but in the place of the crushing force it sustained a tensile strain. The decussating fibers of the levator ani muscle attached to the anterior surface of the anal segment of the rectum, the rectovesico fascia, and the triangular ligament acted as a bond holding the two halves of the levator ani muscle together between rectal and vaginal outlets. Pressure tests showed an average of 80 mm. in the abdominal cavity, 60 mm. beneath the cervix, 40 mm. on the inside of the perineum, and 20 mm. on its external surface before it reached full distention and zero when bulging was complete. Therefore, it would be observed that the perineum must sustain 40 mm. of pressure and actually bore two-thirds of the burden measured beneath the cervix, or 50 per cent. of abdominal strain. But when the perineum was destroyed, pressure tests showed full intraabdominal strain at the vaginal orifice. The reason for this was that the two sides of the levator muscles separated, the abnormally large vaginal orifice offered no resistance and the pelvic organs were held by their ligaments and other suspensory attachments only,

* For original article see vol. lxi, No. 4., pages 582-593.

the support below being removed. Normally the levator muscles drew the perineum forward and beneath the bladder until the posterior commissure reached the trigonum, which covered the outlet like the lid to a box. In lacerations of the perineum this effect was lost. The loose portion of the vesicovaginal section posterior to the trigonum slipped forward, and becoming more or less edematous, passed beneath the trigonum and protruded from the vagina. As it developed, it drew the neck of the bladder and the uterus forward. If the rectal sheath had been torn when subjected to elongation, coincidentally with the distention of the perineum in labor, or if meshing of its fibers had occurred, the rectum rose forward and outward for the lack of perineal support, the thin walls of the rectum being unable to sustain the intrarectal pressure which at times was equal to the abdominal. When dealing with lacerations we must not be unmindful that they were frequently associated with puerperal infection. Inflammatory softening was not confined to the uterus, but it involved the ligaments and arrested the process of involution; they became relaxed and incapable of supporting the uterus. It lay in the hollow of the sacrum, consequently this class of cases frequently began with retroversion. They followed a similar course to those described except the changes took place more rapidly, and there being a greater relaxation of fascia the rectum was disposed to slip forward in advance of the cystocele.

There were exceptions to the general rule in regard to the causes of displacement of the pelvic organs, but it was not the purpose of the author to deal with cases having their origin in new-growths and other specific pathologic lesions, nor was it intended to account for the influence of adhesions to the uterus, etc.

NOTES ON VESICOUTERINE TRANSPOSITION.

DR. THOMAS J. WATKINS, of Chicago, stated that his experience with the operation of vesicouterine transposition for cystocele and uterine prolapse dated from January 28, 1898, since which time approximately 275 cases had been operated. Difficulties which had been encountered in an effort to follow these patients made impossible a satisfactory report on the present condition of more than 104 cases.

There had been no recurrence of cystocele in any of the cases. Thirteen of the patients had had some recurrence of the uterine prolapse. This recurrence had consisted in the protrusion of the fundus uteri or of the cervix. In two cases where the uterus was senile and very small, the fundus and cervix had appeared at the vulvar orifice. These partial failures were almost always due to faulty judgment at the time of operation and could be remedied by a minor secondary operation.

Necessary modifications in technic to meet the requirements of individual cases would now be considered under (1) important features in technic; (2) excision of parts of the uterus.

Blunt dissection with scissors was of much service in separating the vaginal mucosa from the bladder and the bladder from the cervix,

as well as in separation of the vaginal mucosa from the rectum in performing perineorrhaphy.

The transverse incision in front of the cervix should be freely made to facilitate delivery of the uterus and favor free backward and upward replacement of the cervix when the fundus was anteverted. All bleeding vessel should be ligated at this time as they were not easily accessible after delivery of the body.

After the bladder had been separated from the cervix by blunt dissection, a long narrow retractor was inserted to elevate the cervix and expose the peritoneum. The vesicouterine fold of peritoneum was now readily grasped with tissue forceps and incised.

In delivering the uterus the fundus should be brought out first, as the diameters of the fundus were much less than of the anterior wall of the uterus. If the uterus was very large or the case was complicated by fibroids or disease of the adnexa, median longitudinal section through the anterior wall of the cervix and lower uterine segment would facilitate incision of the peritoneum and delivery of the body of the uterus.

The hypertrophied mucous membrane that was frequently found near the urethra should be sufficiently excised to prevent subsequent protrusion. Enough of the vaginal flaps should be excised to dispose of redundant tissue, but enough must be left to allow approximation without tension. The anterior lip of the cervix was now amputated.

The first suture should be so placed that the hernial opening of the bladder would be obliterated by the transposed uterus.

The transverse vaginal incision should usually be closed longitudinally to lengthen the anterior vaginal wall. A complete circular incision about the cervix would permit insertion of the suture so as to further displace the cervix upward and backward, and was useful when the vagina had become much shortened.

Complete hemostasis was essential; low-grade infection by vaginal bacteria followed any considerable retention of wound secretion.

The ultimate success of the entire operation depended largely upon how efficiently the perineum was repaired. The perineal repair should extend to the upper border of the levator ani and should include as much of the pubic portion of this muscle as was possible without too much tension upon the sutures or the excessive narrowing of the vagina.

Excision of part of the body of the uterus should be done whenever the uterus was very large. The excised portion should consist mostly of the anterior uterine wall and in certain cases should include some of the fundus. Enough of the posterior uterine wall should be left to close the hernial opening through which the bladder protrudes. The length of the remaining portion of the uterus should be sufficient to prevent traction upon the cervix and shortening of the vaginal canal when the wound was closed.

Amputation of the cervix should be done when the cervix was much hypertrophied, and especially when very long and protruding through the vaginal orifice.

In cases where much of the uterine body or cervix was excised, the operative technic was simplified by excision of the entire uterine mucosa.

Many of the cases required the use of a catheter for two or three days and occasionally as long as they were confined to bed. Early getting up in these cases was advisable. A considerable number of cases had some vesical irritation for two or three weeks. In only one instance had the bladder disturbance continued. The complication might be the result of catheter cystitis, but was usually a continuation of the vesical symptoms that antedated the operative treatment.

Conclusions.—1. Vesicouterine transposition should be made before much protrusion through the vaginal orifice resulted, as the prolapse rapidly increased after this took place; the more the prolapse, the greater the dangers of recurrences following the operation. 2. Vesicouterine transposition cured cystocele, the most important pathological feature. 3. An occasional recurrence of the uterine prolapse would occur, except in cases where the vaginal canal could be practically obliterated. This recurrence, however, was not serious, as it could be easily remedied. 4. The operative technic should be adapted to each individual case.

A STUDY OF THE END RESULTS OF INTERPOSITION OF THE UTERUS.

DR. JOHN OSBORN POLAK, of Brooklyn, New York, stated that the normal supports of the uterus might be enumerated as follows: 1. The uterine ligaments, especially the uteropelvic and uterosacral, which maintained the cervix in its normal position. 2. The pelvic floor and pelvic fascia which made the pelvic diaphragm. 3. The supporting action of the adjacent pelvic organs. 4. The action of the intraabdominal pressure. And finally, the axial relation of the uterus to the vagina.

The basic principle of maintaining the uterus in position was the retention of the cervix well back in the hollow of the sacrum, while the fundus rested on the pubic shelf; this depended largely on the upward and backward traction of the uterosacral ligaments, the integrity of the fascial sheets, and the upward supporting action of the pelvic floor.

Enteroptosis and an increase in the intraabdominal pressure were factors which persisted long after any operation was done for prolapse of the uterus and therefore were potent causes of relapse. It must not be lost sight of, however, that descensus uteri did occur in women who had never borne children, or who had never sustained sexual relations. In procidentia the vagina became thickened, edematous and the epithelia became dry and horny, owing to the fact that the inverted vagina was the seat of a chronic venous stasis and was no longer moistened by the cervical secretion.

The continued venous stasis produced permanent tissue changes in the infravaginal portion of the cervix and in the vaginal walls, causing the cervix as a whole to be greatly elongated and thickened.

The body was likewise enlarged, the bladder was prolapsed and showed the morbid changes of chronic catarrhal inflammation of the mucosa and of inflammation of the muscular coat.

In the operation for cure, therefore, we should take into consideration a study of the types of prolapse to be dealt with, for an operation which was applicable to one type failed in another. Each case should be studied as to the cleavage plane of its descent, the size of the uterine body, the amount of infra- or supravaginal hypertrophy of the cervix, the extent of the vaginal inversion, the degree of the cystocele and rectocele, including the edema and general condition of the vaginal walls, the presence or absence of adhesions, adnexal tumors, etc., the degrees of visceral ptosis, and intraabdominal pressure, should also have consideration, and finally every patient with pelvic prolapse should be examined in the standing posture.

Interposition or transposition of the uterus must be elected in women past or near the menopause, where the uterine body was small, or could be sufficiently reduced in size and was not diseased by degenerative changes, and when the hypertrophy of the cervix was infravaginal and the cystocele was the chief complicating lesion, provided the prolapse had not occurred at the postpubic cleavage plane. This might be determined by the position of the urethra and a test of its attachment to the pubis.

In his clinic the procedure employed consisted of (1) a high amputation of the cervix, except when the uterus was atrophied and (2) in a longitudinal incision through the anterior vaginal wall from just behind the meatus to the cervix, each lateral flap is being grasped by a ring forceps and the bladder stripped off from its attachment to the vaginal wall in the line of cleavage by blunt dissection.

Vesical disturbances were not uncommon following interposition. These were partly due to displacement of the bladder and the relation of the uterine fundus to the vesical neck, and partly the result of catheterization, necessitated by the vesical spasm, consequent upon the irritation of the perineal sutures. Collicystitis and trigonitis had produced a train of annoying symptoms.

Eighty-two cases individually studied made the basis of the paper. All of the women were at or near the menopause at the time of operation, except four, who were in the active child-bearing period; and all, save these four who were operated while still menstruating regularly, were sterilized by ligation of the tubes with silk and excision and suture of the uterine end of the tube. These four had had very difficult previous labors, yet did not wish to be sterilized, preferring to elect section in case of subsequent pregnancy than go through future infrapelvic deliveries. Two postoperative deaths were recorded; one from acute uremia, the other from septic infection of an intraligamentous hematoma. In all the pelvic floor was restored by a high levator myorrhaphy.

Five cases showed a recurrence of the prolapse, the fundus having fallen forward through the vulvovaginal introitus, owing to the stretching of the anterior vaginal wall. These patients should

never have been subjected to this operation; they were errors of judgment for the following reasons: in one the uterus was too small and senile to act as a supporting bridge; in two the fundus was too large and heavy to be held in position by the atrophied fascia of the vaginal plate; in the other two the vaginal inversion was too great to be properly remedied by this operation, especially as the prolapse had originally occurred in the postpubic plane, hence the urethra and periurethral structures, including the apex of the triangular ligament afforded no pubic shelf on which the anteverted fundus could lie. All five of these women should have been subjected to a hysterocolpctomy. Sixty not only had an anatomical cure, but were freed from all symptoms referable to the pelvis. Nine others had anatomical cures but were annoyed by pelvic symptoms referable to the bladder, lower abdomen, or vagina.

The large majority of these patients had been cystoscoped at some time subsequent to this operation, and a constant cystoscopic picture had been revealed, namely, there had been some infolding of the bladder base, the trigone being injected and elevated above the lateral portions of the base. Trigonitis had been present and produced some vesical irritation in nearly one-half of his cases. Instillation of 25 per cent. argyrol solution had given relief in nearly all. The vesical irritability had been intractable in only three, and in these temporary relief was produced by the topical application of strong silver nitrate solutions to the ulcerative areas in the trigone.

Two, in whom the anatomic and symptomatic result would be considered as satisfactory, had had intermittent attacks of uterine distension, from accumulated secretion behind an angulated cervix; these cases were referred to under complications.

Four were or had been pregnant. Of this number one miscarried at the third month without complications. One was now at the seventh month of pregnancy and presented the following anatomic relations: The cervix was high and well back in the hollow of the sacrum, the anterior uterine wall was still attached to the vagina, but not dragging it up and was distinctly thickened, while the development of the gestation seemed to be going on in the posterior wall and upper segment without symptomatic disturbance. The bladder seemed to have adjusted itself to its new position.

The third patient had a grave toxemia of pregnancy and was delivered spontaneously at six and one-half months. This patient had a very stormy pregnancy for six months, suffering from constant pain in the lower abdomen, traction on the vagina and marked dysuria almost from the beginning of her pregnancy.

One had passed through an uneventful pregnancy and was delivered spontaneously of a living child at term. The interesting feature of this labor was the head was low in the vagina, actually resting on the pelvic floor from the onset of labor, the lower uterine segment was stretched out over the presenting part, and the internal os was effaced before actual labor pains began. Dilatation of the external os and the vaginal introitus were almost simultaneous.

Dyspareunia had figured as a troublesome complaint among these patients.

Incidentally the author called attention to the ease with which vaginal hysterectomy could be done after the uterus had been interposed. The operation was virtually an extraperitoneal procedure and the enucleation might be done practically without shock.

The causes of failure had been primarily: 1. Errors in judgment in the selection of cases for this procedure. 2. Errors in technic. 3. Atrophic tissue changes in the reconstructed supporting structures. 4. Unrelieved intraabdominal pressure acting in conjunction with an abnormally large pelvis, or in a pelvis of faulty inclination.

The author drew the following conclusions:

1. That interposition operations should be limited to women at or past the menopause, with a relatively small uterus, and that when the procedure is elected in those still menstruating, sterilization by tubal ligation should be done at the time of operation.
2. The cases of prolapse in which sliding takes place in the post-pubic cleavage plane, were not corrected by this procedure.
3. That the morbidity is wholly due to technical defects, namely, improper preparation, imperfect hemostasis, vesical injury, etc.
4. That in anteverting the uterus the anterior wall of the uterus should rest on the fascial plate just behind the pubis, the fundus should not be brought under the arch, as excessive anterior displacement not only favored recurrence, but anteflexed the uterus and interfered with drainage.
5. That the curetings from uteri about to be transposed should always be examined, as degeneration may occur, and hysterectomy was easy after this operation.

DISCUSSION ON THE PAPERS OF DRs. NOBLE, WATKINS, POLAK AND HIRST.

DR. WILLIAM E. STUDDIFORD, of New York City, stated that from a number of dissections, and from a study of fresh lacerations, he thought the transversus perinei, as a rule, was a very flimsy, poorly developed muscle, that had no special function in the maintenance of the pelvic floor. Dr. Hirst had not mentioned the relations of the levator ani to the external sphincter. In his experience this had been probably the most important relation, and it was the destruction of this relation that caused a great deal of the prolapse.

As to the question of closure, it was his practice, after having determined the point at which the laceration had occurred, and noting the caruncle on either side of the vagina, to put that tissue by a running suture or by hooks on a stretch. The incision was made through the mucocutaneous junction, and with blunt scissors the dissection was made to the sulcus on either side of the vagina, simply stripping the mucous membrane of the vagina free. With the finger in the denuded area and pressure upward, the original scars formed

by the laceration immediately came into view. To make a complete repair it was necessary to remove all of the scar tissue. The extent of that removal would vary on the two sides of the vagina. Instead of placing the forceps at the top of the rectocele, as was advocated in many descriptions of perineal or pelvic floor operations, the forceps should be placed at the remainder of the posterior vaginal wall. In the majority of cases the laceration occurred either on one side or the other, or maybe on both, usually one side being deeper and more extensive than the other, and usually in the midline or a little deviation to one side or the other. There was a healthy and normal vaginal mucous membrane with a little caruncle on the end, which was very essential in cases that were uncomplicated by extensive rectocele. In the ordinary lacerations of the pelvic floor, where one hoped to restore things to normal, the caruncle should be grasped with forceps and lifted up, and it was easy to denude it on either side, then dissect out the scar, and the minute this was done, cut out a wedge-shaped piece so that in the end one would get a denudation in regular shape. Instead of having to remove some of the healthy posterior vaginal wall, the tab came down much farther, it was lifted up so that one could keep that point in about direct relation with the caruncle on either side, and in the completed operation this caruncle was brought in relation with the tubes at the sides. In stripping off this tissue it brought one down to the connective tissue and sheath of the vagina which was united by interrupted stitches closing up the sulci as far as the vaginal mucous membrane was concerned. Having opened up this point, one would find a bundle of tissue which was largely made up of involuntary muscular fibers which maintained their relation between half of the levator ani and sphincter, and in the majority of cases one would find the sphincter, instead of encircling the rectum, had been drawn either to one side or the other.

In his hands the results had been successful in the majority of cases, in that the pelvic floor had stood the test of subsequent labor. Where the laceration had existed for a long time and pronounced rectocele had developed, and the muscles had become atrophied from disuse, then the denudation should be made very much higher, and one really had to make an overcorrection of the condition, and restoration was not based on anatomical lines, but on lines that would correct the hernia of the rectum, so to speak, and form a support for the prolapsed vaginal and rectal walls.

DR. I. S. STONE, of Washington, D. C., confined his remarks very largely to the paper of Dr. Watkins, and called attention to a point in technic which he had found advantageous. He always made a longitudinal and not a transverse incision, and in thinking it over he did not see how it was more difficult to separate the bladder in this part of the operation than in vaginal hysterectomy. He had had one case of hemorrhage, which was slowly developed under the flap in the anterior vaginal wall after operation which caused alarm but the woman recovered.

DR. EDWIN B. CRAGIN, of New York City, had done the inter-

position operation fairly frequently in the last five years, and was more interested in his partial failures than in his successes. He had had one or two partial failures and emphasized what seemed to be the reason for it. In one the cervix apparently came around a circle and approached the outlet, and he thought the reason of it was the cervix was too long and should have been amputated. In the second place, it was too much anteflexed, and should have either been amputated or straightened out. One of the most important features in this operation tending toward success was to make sure that there was no angle between the cervix and body when one finished the operation, and that the cervix pointed directly backward. To overcome the anteflexion, one should make sure that the suture went right through the vaginal wall and the apex of the angle, straightening out the anterior wall. A third point he emphasized was in regard to doing the operation in the active child-bearing age. So pleased had he been with the operation that he had subjected every woman to it in the child-bearing age. Usually, he thought, the thing to do was to sterilize them by section of the tubes, but one or two men had refused to have their wives sterilized. The women preferred not to have the prolapse recur; they preferred not to have another operation for restoration.

A point he would lay stress on was that the incision was made low so as to get at the fundus rather than to get into the posterior uterine wall.

DR. SETH C. GORDON, of Portland, Maine, said that Dr. Studdiford had practically advised the old Emmet operation for laceration of the perineum, and he believed it had never been improved upon. He had never done any other operation than the old Emmet operation, and, when it was properly done, it would fulfill all of the indications that could be fulfilled by any operation devised. The old operation that Emmet did was practically a butterfly operation. He saw frequently in these days women on whom he had operated twenty, twenty-five and even thirty years ago, who had borne children without any succeeding laceration.

DR. EDWARD REYNOLDS, of Boston, stated the advocates of the interposition operation talked from mistaken premises. Their argument, as he understood it, was that other operations for prolapse ought to be condemned as failures, and that we should do an operation which confessedly produced an abnormality because it was a successful operation. He had hesitated to speak in opposition to the interposition operation, but there were many who felt that the established operations could be made to yield a uniform permanent series of successes. For those in which he could not obtain fairly uniform successful results by the established operations, it seemed to him the interposition operation with its direction of anatomical abnormality might befit surgery for women in the child-bearing age.

DR. PHILANDER A. HARRIS, Paterson, New Jersey, stated that several years ago he presented the description of an operation which involved an abdominal section for prolapse in women who were

passed the child-bearing age. It consisted of pulling the corpus, when it was found to be a healthy normal uterus, and fundus up through the perineum, sewing the perineum around the uterus and fixing it posterior to the fascia. Those who had worked with him began to call it the intramural sequestration and fixation of the uterus without removing any tissue from the patient's body. He did sixty-seven such operations. More recently, within two years, the operation had been done in the Rochester clinic as a German operation, although it was some years before that he described the operation. While it was a departure from the normal anatomy, there had been no complications and no deaths from the method. He would recommend the operation to those who were not satisfied with other methods.

DR. E. W. CUSHING, of Boston, said that while the interposition operation might be successful, yet it was not a good thing for a woman to have her bladder over her uterus. She was not made that way, and if a prolapse could be cured without it, it did not seem altogether fitting. He had been working on prolapse of the uterus since 1877 when August Martin taught him, and he had not found but what these cases could be cured by a good operation with the uterus over the bladder. When one took fascia and brought it together and built up the perineum far enough it would hold. In acute cases where that would not be sufficient, he would not hesitate to open the abdomen and fix the uterus to the abdominal wall, if necessary, but it was seldom necessary.

DR. J. WESLEY BOVEE, of Washington, D. C., had never performed the interposition operation and therefore might justly be called a prejudiced witness. He had not done it because he thought it was an operation in which there was a great deal of mutilation of tissue no longer useful in women who had passed the menopause, and it was dangerous to the woman even to remedy the defects which heretofore had been successfully remedied by the operations in vogue.

As to sterilization, no one had a right to sterilize a woman because she required Cesarean section every time she became pregnant. The older methods of procedure, with proper technic, would cure marked cases of prolapse, but there were some which needed still further treatment. If a woman had passed the menopause, it was probably a better procedure to remove the uterus entirely, to suture the broad ligaments and uterosacral ligaments together to the anterior vaginal wall, not under the bladder, after the bladder had been lifted up, being careful to suture the peritoneal section between the bladder and uterus to the top of the uterus so as not to get adhesions at that point.

DR. JOSEPH BRETTAUER, of New York City, said that the idea of this operation originated with Freund, of Strassburg, who proposed and actually did use the body of the uterus to close up a large opening of the bladder, a vesicovaginal fistula, which he could not close in any other way. This was the start of the interposition operation. Shortly afterward Wertheim in one of his papers on plastic operations mentioned the possibility of using the uterus as a

truss for the bladder. While he had not done it, he mentioned it as a possibility.

In 1896 the speaker published a short article, having carried out this idea in half a dozen cases that had passed the climacteric, and with the result that he did not think it was a proper operation; that there were others which did better service. He had not done it for fifteen years until about six months ago when he had to operate upon a patient who had been operated previously for cystocele. There was a mass protruding from the vagina as large as a pear which was only the bladder wall. In that case the uterus being of good size he thought he might possibly close this very large opening under the fascia with that large uterus. It was a matter of ten or fifteen minutes; there was no difficulty whatever in doing so. Within two months after this operation he was obliged to extirpate the uterus entirely because the woman was very much worse off than she was before he did the interposition operation. However, it had one advantage as he left a shell of the outer coating of the posterior wall of the uterus. In dissecting it out from the bladder, being careful not to go into the bladder, leaving a thin shell, he was able to build up a very good anterior bladder wall, and the woman was cured absolutely, not only anatomically by the operation, but also symptomatically.

DR. MATTHEW D. MANN, of Buffalo, in speaking of the treatment of prolapse of the uterus said he had always tried to keep several points in mind. The first was to restore the uterus to a normal condition as far as possible, reduce it in size and length, either by amputating the cervix or sewing it, by cureting and doing whatever was necessary to restore the organ to normal. A second point was to cure the cystocele which existed in these cases of prolapse by taking out a piece of the anterior vaginal wall, bringing the fascia together and pushing the bladder up as far as possible, and attaching it to the uterus in front as high as he could, and then closing the perineum by an operation which he had found very satisfactory, namely, the old Emmet operation, and in this way one got a good firm support of the uterus. There was one thing to remember, and that was to take some means to keep the uterus anteverted and restore the pelvic floor. The parts were so atrophied in many ways that there was very little tissue and one did not get support and strength enough in the tissues from the long-continued atrophy which had been going on. He did not like to attach the uterus to the abdominal wall in front, especially in child-bearing women. He had followed up the other operations that had been spoken of, and they worked exceedingly well in keeping the uterus anteverted.

DR. GEORGE GELLHORN, of St. Louis, stated that he had been a friend of the interposition operation for more than ten years, but limited it strictly to women who had passed the child-bearing age. He had only done the operation in twenty-five cases. The operation was not perfect, but what other operation was?

As to vesical irritability which sometimes followed the operation,

if one made a cystoscopic examination after the operation he would find a cause for it. He would find in the vesical mucous membrane a number of ecchymoses which were slow in being absorbed, and these were the cause of the irritability. It was due to the fact that the bladder wall had thinned out by the abnormal position of the cystocele, and in pushing it up the uterus itself was apt to be subject to slight traumatism. This traumatism was intensified if the uterus which had to be interposed was too large; then undue pressure was exerted and in just such cases the interposition operation did not seem to be desirable. The uterus must not be too large so as to become angulated. One could avoid this by amputating the cervix or the body of the uterus. He would regret very much if the interposition operation should disappear from our armamentarium, for it was one good method for the individual case.

DR. THOMAS J. WATKINS, Chicago, in closing the discussion said that quite a little had been said about the bladder symptoms. In the last year he had been making careful analyses of the bladder symptoms before and after operation, and they usually balanced. Patients who had had irritation after, had had irritation before, operation, and in the last year he had appreciated the fact that these patients had more irritation before operation than they had subsequently. They had bladder symptoms so long that not much was said about them and the history usually missed it.

As to the question of tubal ligation, he had done very few of these operations during the child-bearing period. In fact, it would seem it was an operation not very often indicated during that period. Before the senile changes of the menopause the prolapse very seldom became so extensive as to require that this operation be done, but some other operation that did not interfere with pregnancy and labor, such as vaginal fixation of the round ligaments, advancement of the vagina upon the uterus, or the operations which had been very clearly elucidated by Dr. Goffe and some others.

As to the question of leaving organs in a different place from where Nature put them, he believed this was not so important. It did not make much difference to Nature how some of the organs were placed after the menopause because they had stopped functioning. A certain part of the pelvic anatomy was made to meet the requirements of pregnancy and labor, so he thought Nature would excuse us if we could improve upon her location of the organs.

DR. BARTON COOKE HIRST, of Philadelphia, in closing the discussion on his part, stated that those who had looked into the subject of perineorrhaphy and had done a great deal of this work would agree with him that the older operations had not proved entirely satisfactory. His professional life had embraced almost the whole history of perineorrhaphy. When he was Dr. Goodell's associate he was doing the butterfly operation, and after having returned from Berlin tried the Martin operation, and then the Emmet. He had done innumerable Hegar operations; he tried the Tait operation, and the modern modifications of it, and none of them gave ideal results and he thought his colleagues who had done these operations extensively would agree with him.

He believed that if his colleagues would try the operation for the restoration of the pelvic floor based on the principles he had outlined, they would find it more satisfactory than any of the older methods.

THE BEHAVIOR OF THE ABDOMINAL CUTANEOUS REFLEXES IN ACUTE CONDITIONS WITHIN THE ABDOMEN AND PELVIS.

DR. RICHARD R. SMITH, Grand Rapids, Michigan, noted the behavior of this reflex in 175 cases in which diseased processes existed within the abdomen. The greater part of them were acute. The results had been compared with the findings at the operation which followed. This reflex and its behavior had been a test frequently used by neurologists, and attention had been called to it in local conditions within the abdomen by several writers. The reflex was obtained by stroking the skin of the abdomen, which normally produced an almost simultaneous contraction of the rectus and oblique muscles on the corresponding side. It was common to distinguish four reflexes—two above and two below. The reflex was very constant in healthy young people, though uncertain in very young infants and in old people or those with very relaxed or very obese abdominal walls—exceptions which must be definitely borne in mind. In the acute inflammatory diseases within the abdomen it was common to find this reflex involved to a greater or less extent, and the test might be made use of in the diagnosis and in estimating the extent of this lesion.

He had found that in seventy-five cases of acute appendicitis the reflexes were more or less involved in sixty-five. It was sometimes involved where rigidity was absent. The reflex was commonly impaired over the seat of the lesion when circumscribed, and in more extensive processes the other reflexes were also impaired. It was commonly, though not uniformly, involved in ectopic pregnancy cases. Its normal presence in cases of bowel obstruction would help to eliminate any acute infectious condition, and in the sub-acute infections of the pelvis he found the lower reflex almost uniformly absent. He believed that, although the test had a certain limited value, that it might be of distinct advantage to the surgeon and it was well worth his careful study.

CAN SURGERY BE ELIMINATED IN THE TREATMENT OF FIBROID TUMORS OF THE UTERUS?

DR. JOHN A. MCGLINN, of Philadelphia, stated that unfortunately there was developing in the profession a more or less general belief that all fibroid tumors of the uterus could be cured, with less danger to the patient by röntgenotherapy than by surgical procedures. On account of this growing opinion he deemed it not amiss to bring the subject before the Society in the hope that the seal of its authoritative approval would be placed upon surgery as the proper treatment of these tumors unless for certain reasons, such treatment was contraindicated.

That röntgenotherapy had a place and a very important place in the treatment of myomas was not to be denied, but he would en-

deavor to prove that there was no justification for the view that surgery should be entirely supplanted. In the preparation of the paper, letters, embodying a series of questions, were sent to 100 of our best-known surgeons and gynecologists and to a like number of the members of the American Röntgen Ray Society. Replies were received from forty-four surgeons and gynecologists and in reply to the question, "Do you believe that all cases of fibroid tumors of the uterus (not including the submucous) should be treated by the *x*-rays?" all answered in the negative. The same question was propounded to the röntgenologists and out of sixty-two answers received, nine answered in the affirmative, twenty-five in the negative, and twenty-eight on account of lack of experience with the method expressed no opinion; of the nine who answered yes, two so qualified their answers that they could really be counted among the negative. A close study of the voluminous literature of this subject gave no justification for the view that the *x*-ray was preferable to surgery in the treatment of all cases of uterine fibroids. Inferentially, however, many of the papers published did express this opinion, and as a result this view was being generally accepted as true.

The results of röntgenotherapy had been reported by Mohr, who gave an analysis of 796 cases so treated, with known results in 669. Of these he reported as cured 376 or 56.2 per cent.; improved, 208 or 31.1 per cent.; unimproved, 74 or 11.1 per cent.; relapsed, 7 or 1.0 per cent.; dead, 2 or 0.29 per cent. Of 380 cases studied from the standpoint of reduction in size, 81 or 21.3 per cent. were unchanged; 219 or 56.6 per cent. showed a slight decrease; 52 or 13.7 per cent. were considerably reduced; 20 or 5.3 per cent. entirely disappeared; in 3 or 8 per cent. there were subjective sensations that the abdomen had become smaller; in 5 or 1.3 per cent. the tumors increased in size.

While the claim was made that 56.2 per cent. of the tumors were cured with a mortality of but 0.29 per cent., in reality but 20 or 5.3 per cent. were completely cured.

Hysterectomy for uterine fibroids had a definite mortality which varied with the skill of the individual operator as to his technic and selection of his cases.

One of the questions asked the surgeons was, "What do you consider an average mortality in the surgical treatment (hysterectomy) of fibroid tumors of the uterus?" The answers indicated an average of 2 per cent. A study of the reports of twenty-one Philadelphia hospitals for one year showed records of 494 cases treated by hysterectomy with seventeen deaths, a mortality of 3.8 per cent. This was a fair average mortality, though practically all the papers on the value of röntgenotherapy placed the surgical mortality at 5 per cent. It was interesting to note that the various complications which rendered *x*-ray treatment unsuitable were the very ones that were responsible in a great measure, for the high mortality rate of hysterectomy. In plain words surgery had to assume the responsibility in the very serious cases which the *x*-ray would make worse.

The author ventured the assertion that the mortality from hysterectomy in competent hands, in the uncomplicated fibroids of the uterus, would compare very favorably with that of uncomplicated appendicitis. If the complicated cases were eliminated from surgical statistics there would be little reason to advocate anything to supplant it.

If all fibroids were operated on early before the various heart changes had taken place and before the various degenerations and complications in the tumors manifested themselves the mortality would be 1 per cent. or less. It was often possible in the young woman, with an uncomplicated fibroid, to save her ovaries and enough endometrium to preserve for her the menstrual function. It should be unnecessary to say anything in reference to the treatment of the small pedunculated submucous polyp and the small growths that could be cured by myomectomy with the preservation of the fecundity of the woman. Here it must be admitted that surgery was in a class by itself.

Apparently there was no question as to the value of the x -ray treatment in certain classes of fibroid tumors of the uterus. It had been definitely proven that röntgenotherapy had, with but few exceptions, controlled bleeding from myomas and had also reduced the size of the tumors in a certain percentage of cases where it had been used.

Many women with fibroid tumors of the uterus were poor surgical risks on account of anemia or associated heart, kidney, pulmonary and other general conditions. To operate on many of these cases was to take an unnecessary risk, when we had a method which even if it did not cure it at least would relieve dangerous symptoms. In many cases so treated the danger of future development was present in spite of treatment, but we took the chance of betterment on account of the grave danger to life from an operation. Again, we would find many women, and we would find many more in the future, who would refuse surgical intervention. These should be subjected to x -ray therapy for the reason that in competent hands the possibility of being benefited was much greater than if nothing was done for them. In the gravely anemic cases, the x -ray should be used to control the bleeding and to enable the patient to get into proper condition for surgical intervention.

Conclusions.—(1) Surgery was the best treatment in fibroid tumors of the uterus and could not be supplanted by any other known form of treatment. (2) Röntgenotherapy had an important place in the treatment of these tumors. (3) Surgeons and röntgenologists should not enter into competition with each other, but should work hand in hand for the relief of womankind.

THE CLINICAL MANIFESTATIONS OF DISEASE OF THE GLANDS OF INTERNAL SECRETION, IN GYNECOLOGICAL AND OBSTETRICAL PATIENTS.

DR. ROBERT TILDEN FRANK, of New York City, presented
1. A summary review of the influence of the individual glands of

internal secretion (exclusive of the ovary) on (a) the anatomy of the genital organs; (b) the function of the genital organs; and (c) the secondary sex characters.

2. He spoke of the differences of effect ascribable to the interaction of the various glands.

3. Effects ascribable to the ovary. (a) Puberty; (b) cyclical changes; (c) pregnancy.

4. Clinical manifestations.

5. Diagnosis.

He then discussed therapy, organotherapy, the use of the x-ray, resection of the ovary, castration, etc.

DR. J. WESLEY BOVEE, of Washington, D. C., read a paper on

COMPLETE STERILIZATION OF THE SKIN BY IODINE.*

IODINE AS A STERILIZING AGENT IN SUPRAVAGINAL HYSTERECTOMY, WITH REMARKS UPON MORBIDITY.

DR. I. S. STONE, of Washington, D. C., pointed out that the low rate of mortality following hysterectomy appeared to have satisfied the surgical mind, if we might rely upon the output of literature upon this subject. Since the comparatively low rate of 5 per cent. had been obtained by many operators, and a still lower rate by a few, he noted the rarity of remarks upon the morbidity which must still exist and which should be minimized if not eradicated.

It was unnecessary to repeat or to discuss the findings of those claiming the absence of infective bacteria in the uterine canal. Everybody knew that the vagina contained many varieties, and some say these were good enough to penetrate only a short distance into the cervical canal. However, this might be, all of the hysterectomists feared an infection about the stump, under the bladder, or between the peritoneal folds, as after the removal of an intraligamentary growth.

Dr. LeRoy Broun had discussed this subject in a paper and had mentioned the practice in vogue, namely, the drainage of the cervical canal or the space above the cervix through the canal. In common with many, the writer also drained many of his cases, with the result that an improvement was shown in diminished morbidity. Every variety of method such as gauze or tube drainage, and the removal of the cervix was practised by many to promote drainage. The writer had always found good results followed these methods. There was a very small mortality after total hysterectomy for fibromyomata, and the practice of some kind of drainage was desirable in the absence of a definitely sterile field through which to make the amputation of the uterus.

With the nearly perfect results of skin sterilization he would not deal with at present, but the application of iodine alcohol to the

* For original article see page 12.

vagina and uterine mucosa had been productive of results which appeared to approach the ideal. The patient was brought to the operating table after the proper examination had been made which showed her condition to be satisfactory for operation. She was placed in the lithotomy position and a 25 per cent. (1.75 iodine) diluted alcoholic tincture of iodine was applied over the genitals and introitus vaginae. The catheter was used immediately after this, and a perineal retractor introduced into the vagina and a volsellum used with which to grasp the cervix. The cervix was dilated to admit the conical nozzle of a 2-ounce glass syringe. An ounce of the same 25 per cent. alcohol solution was then slowly injected into the cavity of the uterus. The fluid was not allowed to remain as long, nor was great force used as had been advised. After the injection the cervical canal should be again gently dilated to make sure of the discharge of the excess of the solution. Every part of the vagina was exposed and the assistant who made this application to it made this feature of the technic an important one. The operation was preceded by a second application of iodine to the skin over the abdomen, the first having been made before the anesthetic was given. After this the operation proceeded as usual and a final application of the iodine was made to the stump before closing the flaps if there was the slightest intimation that infectious matter had been handled, such as in an appendix, pus tube, etc. Finally, the iodine solution was applied over the closed abdominal incision before the usual gauze dressings were applied.

DISCUSSION ON THE PAPER OF DR. STONE.

DR. WILLIAM E. STUDDIFORD, of New York, asked Dr. Stone whether in any case in injecting iodine into the uterine cavity it had been forced through the tubes into the peritoneal cavity and if so, had it caused any disturbance.

In the course of the winter he attempted to have *x*-ray pictures made of the uterine cavity and for this purpose attempted to inject collargol into the uterine cavity in the cases of movable retroversion. His object in getting the *x*-ray picture was to note the position of the uterus, if he could get suitable pictures, and then replace the uterus by inserting a pessary, and after the second injection he did not know whether the uterus had been raised. A small amount of collargol was injected without pressure, and within six minutes of the injection the woman had a most intense colic, so much so that it was necessary to give her morphine for relief. These injections were made about two hours previously to putting her under the anesthetic for operation. On opening the abdomen, to his surprise he found most of the collargol was in Douglas' pouch and both tubes were filled with the fluid. Nevertheless he proceeded with the operation and the woman had no unusual symptoms and made a perfect recovery.

DR. WILLIAM P. GRAVES, of Boston, stated that Doederlein whenever he made experiments at the time of doing a hysterectomy for fibroids or something of that kind, would have his assistant inject

the uterus with iodine and other substance, and in every case where a colored substance was used the liquid appeared almost immediately at the fimbriated ends of the tubes and drifted out into the peritoneal cavity, so that he should consider the injection of iodine, unless it was done immediately previous to the operation, dangerous.

DR. HENRY T. BYFORD, of Chicago, said it was important to know whether one would be justified in using iodine for the sake of the slight risk of cutting into a cervix which is not very septic and which one could disinfect immediately.

DR. REUBEN PETERSON, of Ann Arbor, Michigan, said Dr. Stone had brought up the interesting question of whether we should or should not sterilize the cervix with iodine before doing hysterectomy. The injection of iodine prior to the operation was a time consuming element at least, so that if we could dispense with it, it was far better to do so. In the majority of cases he thought such a procedure was unnecessary.

DR. J. WESLEY BOVEÈ, of Washington, D. C., said that if he were to do plastic work in the vagina, or plastic work on the perineum, or abdominal work, or pelvic work transperitoneally, he sterilized the genital tract as far as the fimbriated ends of the tubes from below with the iodine, and he had been doing this uniformly for two years at least, and he never injected the uterus with iodine without the patient being anesthetized, and he would expect really, if he injected the uterine cavity with any degree of pressure with iodine or collargol, a disagreeable effect. We know the marked pain the patient got from injecting the renal pelvis with collargol. The patient usually had a colic as a result of it.

As to finding material in the peritoneal cavity in passing through the Fallopian tubes, he called attention to the fact that there were no bad effects from it.

DR. STONE, in closing the discussion, said that the remarks of Dr. Studdiford had been answered pretty well by Dr. Bovee as to injection of the tubes with iodine.

As to the possibility of working out a scheme to photograph the Fallopian tubes by the injection of collargol, he had never injected the uterus with any pressure, except when the patient was to be operated on and the abdomen opened immediately afterward, and it was not necessary. There were certain cases where it seemed impossible to inject the tubes themselves or to reach them so that one had definite evidence of it.

OFFICERS.

The following officers were elected, *President*, DR. THOMAS J. WATKINS, Chicago; *First Vice-President*, DR. F. F. SIMPSON, Pittsburg; *Second Vice-President*, DR. HOWARD C. TAYLOR, New York City; *Secretary*, DR. LEROY BROUN, New York City; *Treasurer*, DR. J. WESLEY BOVEÈ, Washington, D. C.

Place of meeting next year not decided on.

BRIEF OF CURRENT LITERATURE

OBSTETRICS.

Etiology of Extrauterine Pregnancy.—M. Schil (*Jour. de méd. de Paris*, No. 17, 1914) advances a new theory as to the causation of extrauterine pregnancy. The factors may be inflammatory or non-inflammatory. According to some authors they are due to polypi in the tube, and fibromyomata, or other tubal conditions, or they may result from external pressure, from other tumors not in the tubes. The author does not accept these as the origin of all cases of extrauterine pregnancy. He believes that the essential factor is a failure of the unstriped muscle fibers of the tube to contract, so that the ovum does not pass into the uterus. What the factors are that prevent the contraction are not stated.

Antenatal Hygiene, Its Influence upon Infantile Mortality.—A. Routh (*Brit. Med. Jour.*, Feb. 14, 1914) says that we are faced with four well-defined conditions which are reducing the number of infants needed to replenish the population: postponement of marriage; the artificial prevention of fertilization of the ovum by one or both of the potential parents; antenatal mortality; and infantile mortality during the first year of life. As fertility diminishes with advancing age, change in the date of marriage must have an appreciable effect in diminishing the birth rate, and represents, the Registrar-General states, 1.56 per cent. of the total reduction in the birth rate. The extent to which the artificial prevention of maternity is carried in any nationality can only be roughly estimated by the difference between the past and the present birth rate. The Registrar-General says that if the fertility of married women in proportion to their numbers had been as high in 1911 as in 1876-1880, the legitimate births would have numbered 1,273,698 instead of the 843,505 actually recorded. This means a potential loss to the nation of 430,193 lives in the one year (1911). Adopting the moderate estimate of four abortions to each stillbirth we get a total of 98,680 abortions, premature labors and stillbirths in 1910, and 96,925 in 1911, not very different from the number of deaths of children under one year of age from all causes in the same years—namely, 94,579 in 1910 and 114,600 in 1911. The total live births in 1910 were 896,962, and in 1911 881,138, so that the antenatal deaths were in proportion of one to every nine births, about 11 per cent. in both years, and this is probably far less than the real percentage. The dangers to which the fetus is directly or indirectly liable may be relieved by philanthropic, legislative, and medical means. The first includes assistance by supplying nourishing food and sani-

tary dwelling rooms and restriction of industrial employment late in pregnancy. The writer advocates also a small weekly pension to be paid after the sixth or seventh month when the woman has voluntarily reported herself pregnant, in addition to the present maternity benefit of 30 shillings now paid after birth. If poor pregnant women could be sent to country homes or sanatoriums during part of their nine months' expectancy, very great good could be done. The writer also urges earlier notification and registration of pregnant women and compulsory registration of stillbirths. The remainder of his paper is devoted to medical and surgical prophylaxis.

Professional Diseases in Reference to Pregnancy.—Giuseppe Vicarelli (*Ann. di ostet. e gin.*, March 31, 1914) says that various occupations react injuriously on pregnant women, and may injure the growing fetus. A particular kind of labor creates a particular type of individual laborer. Poisoning and intoxications affect the health of the pregnant woman. Bad surroundings militate against healthy children. The weight of the children born in the Institute of Obstetrics of Turin was carefully kept and the conditions and work of the mothers were tabulated. Among these a normal weight has been shown to be 3250 grams, length 50 centimeters. From 1885 to 1912 there were 17,345 deliveries at the Institute; out-patients numbered 22,440; and 7108 other women were assisted, a total of 46,893. The author tabulates 4408 cases who worked in industrial establishments and so were suitable for his researches. The women were Piedmontese, larger and heavier than those in other parts of Italy, and the average weight of the fetus was 3400 to 3700 grams; the height, 53.54 centimeters. Of the 4408 women the average weight of fetus was 2973 grams; the height, 49.80 centimeters for women who worked in trades and were primiparæ. Of the children of multiparæ the weight was 3132 grams, the height, 50.17 centimeters. It would seem that the children of the working classes are physically smaller than normal, and this would indicate a decay of the Italian race due to conditions of labor. Mental and physical degeneration, and liability to disease, and the inability to nurse children all go to show the existence of degeneration. Hygiene should be made better; hours of work should be shortened, and the mother should not be allowed to work during late pregnancy. It is found that women work under more unhygienic conditions than men, because the latter are better organized and demand more. The author now goes over separately the various industries in which women engage. Agricultural work is not unhygienic but it is very hard work and may result in deformities of the pelvis and back. It causes disease of the genital organs, and increase in frequency of abortion, and premature labor. Industries which include work in metals are as injurious as any. They cause poisoning by lead, arsenic, antimony, and mercury, all of which are very unfavorable to the pregnant mother and produce deficient children. Menorrhagia and abortion are caused by chronic mercury poisoning. Phosphorus poisoning causes interruption of pregnancy and uterine hemorrhage,

Lead causes uterine hemorrhage, abortion, early infantile mortality, congenital monstrosities, idiocy, imbecility and epilepsy in the children that live. Of eighteen women working in chemicals the children averaged 2922 grams in weight, and were 49.72 centimeters long. Textile industries cause bronchial irritation from dust. Work in tobacco causes tuberculosis of the lungs. Anemia and overfatigue affect the condition of the child through the mother and many poisons are carried to the child through the mother's milk. Especially in the cities these conditions cause progressive physical and mental degeneration. The pregnant mother should be protected by law from these influences during pregnancy.

Hemoconies in Icterus of Puerperal State.—C. Jeannin and A. Lavant (*Rev. de gyn. et de chir. abd.*, April, 1914) defines hemoconies as small corpuscles visible in fresh blood, having Brownian movements, especially plain when examined with the ultra-microscope. They become enormously increased in number during the period of absorption of fatty matters from the food. They are probably the specific carriers of the fats of the food. A study of the variations in number of these corpuscles is of value in determining the function of the hepatic cells. It is the bile which plays a great rôle in absorption of fats, and the suppression of the stream of bile into the intestine shows a defect in absorption of fats, and the non-appearance of hemoconies in the blood after a fatty meal indicates fatty insufficiency. The examination for these cells furnishes a means in cases of icterus, of determining the activity of the hepatic cells. Bar applied this method at the Tarnier Clinic in women before and after labor. Histories are given of three women examined who had intoxication of pregnancy, and two women with puerperal infection. The three cases of intoxication showed various degrees of icterus. In the first, failure of the glycolytic power was indicated, but the examination of hemoconies showed normal power of fatty absorption, and the prognosis was good. In the two other cases icterus was slight. Absence of hemoconies in the first showed failure of hepatic function, and rapid interruption of labor was indicated. In the third the failure of the corpuscles also indicated operation, which was performed with success. In the infected cases when the liver is affected the intensity of the icterus is not an indication of the severity of the case, and the loss of hepatic power. In the first case the examination allowed of a definite prognosis; the condition did not appear serious, yet the corpuscles were absent, and showed grave hepatic alterations; death ensued. In the second, death ensued unexpectedly. Thus it is seen that the number of these corpuscles is an aid in prognosis, and in giving indications for interference with labor.

Treatment of Hemorrhage in Placenta Previa.—A. Brindeau (*Rev. mens. de gyn., d'obst. et. de ped.*, April, 1914) says that placenta previa is dangerous alike for mother and child. The mother may die of hemorrhage, of anemia, or of septicemia after delivery, or during pregnancy. According to modern statistics 6.5 per cent. of deaths are from infection and 2.5 per cent. from hemorrhage,

showing that the danger of infection is greater than that of hemorrhage. The lower the location of the placenta the nearer it is to the vagina and the greater the danger from infection. Blood infections causing embolism and phlegmasia are frequent. The fetal mortality is 25 to 70 per cent. and is easily explainable; at term the fetus dies of asphyxia, but in many cases there is abortion or premature labor and the child is never viable. The maneuvers of dilatation and delivery contribute to the bad prognosis, and prolapse of the cord is frequent. The old methods of treatment by forcible dilatation are past. They were too dangerous and too brutal. Vaginal tamponment is still in use. It has considerable disadvantages; it may control external hemorrhage, and allow the internal to continue, thus jeopardizing the life of the patient. But if the tampon is well introduced and antiseptic it checks hemorrhage, and allows dilatation to go on, the fetus often being expelled with the tampon. It causes pain and anxiety to the patient, pressure, and retention of urine. The treatment should be divided into obstetrical and surgical. The surgical is to be reserved for the small number of cases, the obstetrical being applicable in almost all cases. The simplest treatment is artificial rupture of the membranes, which allows the head to descend and act as a tampon. In central placenta previa it is necessary to pass through the placenta to rupture the membranes and this may be done in two ways; either burrow up alongside of the placenta, separating it with the fingers, or bore through it rapidly. This will accomplish arrest of the hemorrhage in 50 per cent. of the cases. The second method of treatment is to cause the fetus to become a tampon, by bipolar version. This is sometimes dangerous for the mother, and may compress the cord and kill the child. Another procedure is to dilate by means of rubber balloons, which at the same time act as tampons. The most dangerous is rapid dilatation by means of metallic dilators, which may leave a rupture of the uterus and give rise to hemorrhage or septicemia after delivery. But at times a rapid dilatation alone will save the life of the mother. The surgical treatment consists of Cesarean section, abdominal or vaginal. The greatest difficulty occurs when the cervix is not dilat-able when dilatation must be secured. Treatment is comparatively simple when it is complete. The author recommends the following course: first try rupture of the membranes, the balloon, bipolar version, manual dilatation, etc., in the order given. These will be sufficient in most cases. When impossible to deliver in this way, use surgical treatment. But this should be applied only to exceptional cases.

Resistance of the Uterine Cicatrix in Cesarean Section by Extraperitoneal Method.—S. Delle Chaije (*Rev. mens. de gyn. d'obst. et de ped.*, April, 1914) says that the results of the extraperitoneal Cesarean section have been so far from encouraging that it has not been extensively used. The cicatrix has been shown to be weak in some instances and danger of rupture to the uterus in a later pregnancy is present. The lower segment of the uterus is less likely to be firm as that higher up. The author presents the history of a case

in point. Veit would substitute a longitudinal incision for the transverse one. Under the softening of the uterine tissues the cicatrices become softened also and rupture is known to occur. The best guarantees of a good cicatrix are thickness of the sutured tissue, perfect coaptation of the layers, exclusion of germs from the wound. Thinning of the cicatrix has been observed in 17 per cent. of cases. This may be due to a partial cicatrization of the wound especially in its subperitoneal portion. The walls are thin, and the ante-flexion of the uterus which is seen after labor assists in the thinning, by rendering good coaptation less possible; hematomata form in the wound and these are easily affected by infectious agents. The vaginal Cesarean section is indicated when the bony canal preserves its equilibrium, and when a rapid termination of labor necessitates rapid delivery. Here the length of the cervix remaining the same, the cicatrix is taken away from the influence of distension and may oppose greater resistance to a later dilatation. With present experience we should not be optimistic in our beliefs as to the strength of the cicatrix in the inferior segment of the uterus. These tissues of the cicatrix give no security in a later pregnancy.

GYNECOLOGY AND ABDOMINAL SURGERY

Peristaltin after Laparotomies.—Flatau (*Monatschr. f. Geburtsh. u. Gynäk.*, Bd. xxxix, Hft. 5) employed this new remedy for the prevention of intestinal paresis in a series of fifty successive laparotomies approximately twenty-four hours after the operation. He found that the remedy produced a true intestinal peristalsis and diminished the stage of postoperative paresis. By preventing the formation of adhesions and their consequences, he claims that its prophylactic value is most important and in the series of cases in which he used the same, no after-effects were noted. The remedy was given by injection into the fatty tissues of the abdominal wall, and the intramuscular tissue in the thigh. He believes that it may be safely used in every laparotomy for the reasons stated.

Continuous Radiation.—Müller (*Monatschr. f. Geburtsh. u. Gynäk.*, Bd. xxxix, No. 5) presents a method of continuous deep radiation which he claims to have been successful in a number of cases of uterine fibroids with metrorrhagia. In this series the average length of treatment before amenorrhea was attained, was sixty-nine days, during which fifty-five exposures were made for periods of about thirty minutes each, given for alternating periods on the abdomen and back. The author claims this treatment is both efficient and safe.

Exploratory Puncture in Gynecology.—Kakuschkin (*Zeitschr. f. Geburtsh. u. Gynäk.*, Bd. lxxv, Ht. 3) favors exploratory puncture through the posterior vaginal fornix in a large number of gynecological conditions for purposes of diagnosis and treatment. He presents the histories of twelve cases in which the temperature and the local processes were markedly influenced and concludes that in some cases of pelvic exudate and infiltration, exploratory puncture

will bring about a reduction in the temperature and hasten the absorption of the inflammatory products. This reduction in the temperature may be permanent or more or less transitory. In cases of fresh exudate, or collections of virulent pus, the temperature may remain the same after the puncture, or increase. Continued reduction of the temperature accompanies a rapid consolidation and reabsorption of the exudate. The author believes that the antipyretic effect of the exploratory puncture is brought about by circulatory changes at the site of the puncture, either as the result of trauma or the removal of part of the contents of the inflammatory focus by the aspirating action of the syringe employed for the purpose. In the latter case the effect is similar to that obtained with the Bier's cup.

Changes in the Ovaries after Exposure to Radium.—Schiffmann (*Zentralbl. f. Gynäk.*, 1914, No. 21) presents the results of an extended series of experiments in guinea-pigs which were exposed to radiations from radium and mesothorium. Histological examination of the ovaries showed that the corpus luteum manifested certain changes which approached the physiological so that no conclusions could be drawn. On the other hand there seemed to be a well-marked analogy between the effects of radium and Röntgen ray manifestations in the ovaries in which damage to the follicles seemed to be the most prominent and constant finding.

Adenomyoma of the Female Genital Tract.—Bortkiewitsch (*Arch. f. Gynäk.*, Bd. ci, Hft. 3) presents a study of ten cases of adenomyoma which seem to show that tumors so-called, are not actual neoplasms but merely a muscular hyperplasia depending on a chronic inflammatory process. The islets of mucous membrane occurring in such tumors are developed either from the epithelial layer of the serosa or from the mucosa. Very rarely these epithelial inclusions are derived from the embryonal cells of the Müllerian or Wolffian bodies. In even rarer cases the glandular constituents have their origin in the remains of the Wolffian body. In exceptional cases the glandular inclusions in such tumors may be derived from the mesonephros.

Etiology and Bacteriology of Leucorrhœa.—Curtis (*Surg., Gyn. and Obst.*, March, 1914) discusses this subject mainly from the bacteriological standpoint, having studied cultures taken from seventy-five patients. He concludes that the uterine cavity tends to remain free from bacteria in cases of leucorrhœal infection but mucous secretion from the cervix may promote the development of puerperal discharges. The usual seat of formation of the puerperal discharges is the lower genital tract. In unmarried women gonorrhœal infection precedes the development of chronic leucorrhœa in the majority of instances and the chief part played by the gonococcus consists in preparing the soil for other organisms. Leucorrhœal bacteria consist largely of anaërobes of which gram-negative bacilli form a large proportion. It is highly probable that these bacteria play an active part in the production and maintenance of leucorrhœa.

Common aerobic organisms, such as bacillus coli and staphylococci, seem to be of minor importance.

The Heart in Fibroid Tumors of the Uterus.—McGlenn (*Surg., Gyn. and Obst.*, February, 1914) in calling attention to the frequently observed relationship between these two conditions, presents an extended study based on the records of 2700 autopsies made at the Philadelphia General Hospital, which is supplemented by a study of an additional number previously reported. In 632 female bodies, fibroid tumors of the uterus were found in 131. Among this number of cases there were only seven normal hearts; the remainder included thirty-five different varieties of cardiac lesions. It seems reasonable to conclude from the exhaustive study presented that a definite entity of a so-called "fibroid heart" cannot be sustained. If the fibroid tumors of the uterus are the cause of all the heart lesions described in this study, then every tumor regardless of its size and situation should be removed. This is a contention that the most radical would hardly admit. Uterine myomata occurring in middle and advanced life are practically always associated with sclerotic heart lesions. These lesions are a part of a general process and bear no relation to the fibroid. Large tumors by increasing the work of the heart, and tumors causing pressure on the pelvic circulation may produce hypertrophy and secondary dilatation of the heart. Anemia from hemorrhages, infections and certain degenerations of the tumor may affect the heart secondarily, possibly causing fatty degeneration, brown atrophy, or cloudy swelling. The majority of cases of such degenerative process found in connection with fibroid tumors of the uterus are not caused by the tumor, but by conditions entirely foreign to the same.

The Thyroid Treatment of Uterine Hemorrhages.—Sehrt (*München. med. Wochenschr.*, February 10, 1914) calls renewed attention to a form of uterine hemorrhage noted especially during the period of puberty and the menopause in which changes in the uterus cannot be definitely established, either microscopically or macroscopically. It has come to be believed that these hemorrhages are purely functional, due to a disturbance of some internal secretion which, however, has not been definitely established. More recent studies along these lines have shown that there is a close connection between the thyroid and the ovaries and that this gland may be responsible for ovarian conditions which result in bleeding from the uterus. This seems to be shown by the behavior of the blood in the presence of hyperthyroidism or hyperfunctioning, in which the blood is abnormally slow in coagulating, while with hypofunctioning it coagulates very rapidly. The microscopical picture which includes both of these conditions is marked by a relative neutrophile leucopenia and a relative or absolute lymphocytosis. In view of the association between hypothyroidism and uterine hemorrhage, Sehrt administered the thyroid gland in a series of twenty-five cases with pronounced benefit. He calls attention to the necessity of carefully judging the indications as not all the cases are suitable to the method, only those being thus treated in which no abnormality

was found either in the uterus or ovaries to which the hemorrhage could be ascribed. Diseases of the heart, kidneys and vessels were also excluded. He employed a combination of iodine and thyroid, known as iodothylin, the dose being regulated by the condition of the blood as regards the coagulability and proportions of leukocytes and lymphocytes. A blood-control test was made at intervals of from eight to fourteen days. The effect of the medication was not only marked by the cessation of the hemorrhages but by an improvement in the general health, including an increase of weight and the hemoglobin content of the blood. Sehrt is not prepared to state definitely how the effect is obtained. It is probable that two factors are involved in these hemorrhages: either the ovary is directly influenced by the blood containing a diminished amount of thyroid substances, or in view of the insufficient action of this gland, an auto-intoxication of the body by insufficiently developed albuminoids, results. The nervous disturbances which frequently accompany these conditions are also markedly improved by the treatment as well as the frequently associated obstinate constipation.

The Source of the Hemorrhage in Ruptured Tubal Pregnancy.—Taniguchi (*Arch. f. Gynäk.*, Bd. cii, No. 2) has made a careful study of a ruptured tube obtained by operation which, together with a study of the literature leads him to the following conclusions. In this particular specimen the point of rupture did not occur at the attachment of the placenta but in the area directly opposite. There were evidences of marked congestion present and this probably predisposed to the rupture. He claims that the immediate cause of a tubal rupture is the sudden increase of pressure in the amniotic sac due to hemorrhage from the veins. The forcible tearing away of the chorionic villi which occurs, is produced by the contractions evidently in the muscular wall of the tube. The severe bleeding comes from the intervillous spaces and is the result of the direct communication of the arteries with the same, together with the inability of these vessels to contract properly because of anatomical differences in their structure.

Icterus Associated with Extrauterine Pregnancy.—Schottmüller (*München. med. Wchnschr.*, 1914, No. 5) states that icterus during pregnancy is not only due to a complicating disease of the gall-bladder or the bile passages, but may be of hemolytic origin. The latter is most often seen in association with infection from the uterus. In such cases the serum of the patient will respond to the tests for methemoglobin. Another class of cases in which this has been noted are those in which free abdominal hemorrhage has resulted from ruptured ectopic gestation. He reports a number of cases in which these findings were noted and believes that the presence of hematin in the blood serum may be accepted as an evidence of extrauterine pregnancy. The coloring matter in the blood serum may be demonstrated both by spectroscopical and chemical examinations and may be regarded as a practical clinical procedure.

The Effect of Duplication of the Genital Organs in Labor.—Zalewski (*Arch. f. Gynäk.*, Bd. cii, Hft. 1) has collected a series of fourteen cases from a Breslau clinic in which dystocia resulted from de-

formities of the uterus and vagina. He calls attention moreover to the difficulty of diagnosing these conditions, which, in a number of cases were found to have entirely escaped recognition. The following complications during labor were noted: tendency to miscarriage and premature labor, abnormal positions, obstruction to delivery by a vaginal septum, uterine inertia, retention of the placenta, postpartum hemorrhage from the uterus or as the result of laceration of the vaginal septum and obstruction to labor from the non gravid portion of the double uterus. Other possibilities noted in the series of cases were lacerations of the uterine septum in forceps deliveries with fatal hemorrhage and the introduction of a dilating bag into the non-gravid portion of the uterus with rupture of the latter and a fatal peritonitis. Retention of the placenta is also likely to occur and a search for such remnants may have been conducted in the empty uterine cavity. Involution of the uterus during the puerperium is also apt to be interfered with in these cases. The author recommends that as a prophylactic measure in subsequent labors, a resection of the uterine septum be made and the two halves of the uterus sutured together.

The Influence of Douches on the Bacterial Content of the Vagina in Pregnancy.—E. Zweifel (*Monatschr. f. Geburtsh. u. Gynäk.*, Bd. xxxix, Hft., 4) presents the results of an extended series of observations made at the end of pregnancy in which the effect of douching was controlled by careful bacteriological examinations. A total of forty-four cases was studied and solutions of oxycyanide, bichloride of mercury, lysoform and potassium permanganate were found to diminish only temporarily the number of colonies and this was likewise observed after the application of tampons saturated with solutions of iodine and alcohol. The results were very unsatisfactory with the use of distilled water as well as of boracic acid and aluminum acetate as well as the dry treatment with powder. It would appear therefore that these douches are entirely unnecessary in the presence of normal vaginal secretions. In the presence of bacteriological conditions however, the quantity of infectious material is undoubtedly diminished and further experiments with the use of lactic acid douches are still in progress and these are apparently of considerable value.

The After Results in Cesarean Section.—Rohrbach (*Zeitschr. f. Geburtsh. u. Gynäk.*, Bd. lxxv, Hft. 3) has examined thirty-eight women, or about one-third of those who were operated on at Küstner's Clinic in Breslau during a period of five years, for the purpose of studying the after effects of the operation and the comparative value of the extra- and transperitoneal procedures. He found that there were no complaints after the operation and that the ability of the women to work was not interfered with. No disturbances of the bladder were found and even where lacerations of this viscus occurred, no permanent injury resulted. Of the children delivered by this means 100 per cent. survived the operation and 81.5 per cent. lived beyond the first few months. The author found that the danger of hernia was not entirely avoided and that the percentage varied between 6 and 8 per cent. The extraperitoneal procedure seems to

afford a more favorable result, however, than the transperitoneal. The extraperitoneal operation through the cervix did not result in adhesions in a single case and in the majority of cases (82 per cent.) the normal position of the uterus was retained. Rohrbach believes that the extraperitoneal operation is the more serviceable and its advantages have now become fully established.

The Significance and Treatment of Retained Placental Remnants.

—Winter (*Monatschr. f. Geburtsh. u. Gynäk.*, Bd. xxxix, Hft. 5) in studying the relation between retained pieces of placenta and puerperal infection, concludes as the result of an extended series of observations that such remnants usually do not produce either local or general pathognomonic conditions. The symptoms which appear in connection with the retention of such remnants are local inflammatory processes in the endometrium, associated with disintegration of the placental remnants. He believes that the latter *per se* are never the cause of severe puerperal infection but that the associated rise of temperature is the result of direct infection from examinations or operative interference, although it is probable that the retained secundines favor the severe infection. Winter claims that the exploration of the interior of the uterus with the finger in the hope of locating a retained piece of placenta as the cause of puerperal fever is unjustified and should not be undertaken on account of the associated dangers. Active interference in such cases is followed in from one-half to two-thirds of the same in a more or less severe process which in from 7 to 9 per cent. is fatal. The clearing out of the uterine cavity seems particularly dangerous in hemolytic streptococcal infection. Spontaneous expulsion of the placental remnants is quite free from danger and in only exceptional instances does the fever remain. Even where these have been retained for a prolonged period, the maternal tissues and rarely the blood are involved in the infectious process. From his personal experience and the results of the cases reported thus far in the literature, Winter believes that a search for retained placental remnants should only be made in the presence of hemorrhage and is not indicated by fever. However, if such a retention is recognized at the time of labor the same may be immediately removed and if diagnosed during the puerperium with certainty and any fever is present, it may also be extracted. If severe hemorrhage occurs the uterus should be cleaned out even in the presence of fever. If a spontaneous expulsion does not occur, the further treatment depends entirely on the result of the bacteriological examinations and if only saprophytic organisms are present the uterus may be cleaned out. On the other hand if virulent bacteria, especially hemolytic streptococci are diagnosed, further active treatment must be stopped and the spontaneous expulsion or disappearance of the virulent germs waited for. If an involvement of the peritoneum, parametrium, or the adenexa is found, a conservative procedure must be followed, and only in the presence of hemorrhage is a careful removal indicated. Sharp instruments should not be employed in these conditions but the result secured with the finger as a curet.

The Relations of Anaphylaxis to Pregnancy and Eclampsia.—Eisenreich (*Volkmann's klin. Vorträge*, N. F., 1914) after reviewing the literature on the theories regarding eclampsia in general and the results of anaphylaxis disturbances, presents his own studies made for the purpose of determining whether certain relations of an anaphylactic nature were present between the mother and the fetus. The results were entirely negative. He then continued his experiments for determining the behavior of the complement in normal and pathological pregnancy. Although the complement content of the blood in eclamptic women as compared to that of normal cases of pregnancy varied considerably there was no reason for assuming however that a typical complement disappearance occurred. The differences in the results of experiments with the serum of eclamptic and normal individuals were sufficient however to lead the author to conclude that in eclampsia pathological changes occur which do not take place in the normal individual, or if so, only in exceptional cases. Finally, no immunity relations between mother and child could be demonstrated with the help of the complement fixation test. The results of this investigation seemed to agree with the observations of other investigators in the past regarding immunity. As these investigations relate only to the behavior of the serum of the mother and fetus they must be regarded in a restricted sense, for the influence of the placenta in the study of eclampsia problems cannot be disregarded.

Oxytoxic Remedies.—Tassius (*Arch. f. Gynäk.*, Bd. ci, Hft. 3) presents the results of a study with various remedies for combating uterine inertia made in a clinic at Breslau during a period of two years in an extended series of cases. The administration of sulphate of quinine afforded very favorable results, especially in cases of abortion where temperature was present. He believes that quinine may be used in the period of dilatation as well as during that of expulsion and it is also of value in cases where labor is induced before term. Pituitrin was found to be a reliable remedy in secondary inertia and the effect increased with the period to which labor had advanced. In the process of abortion it favors the process of dilatation and makes curettage easier. For the induction of premature labor it was found of less value but during the puerperium, especially for hemorrhage it was very serviceable. Tassius is convinced however that it cannot induce labor pains. Unfavorable influences on either mother or child are relatively rare if care in the administration is observed. Pituglandol was found to be very efficient in secondary inertia as well as in abortions and the induction of labor, although it is not efficient for the production of the latter. The writer states that it is valuable in eclampsia, placenta previa, uterine hemorrhage, particularly in combination with ergot preparations. Secacornin, an ergot derivative, was not found to be of value during labor or in the treatment of abortions, and the site of injection was likely to be painful. It was particularly applicable however to the postpartum period after the delivery of the placenta.

Corpus Luteum, Menstruation and Pregnancy.—J. W. Miller (*Arch. f. Gynäk.*, Bd. ci, Hft. 3) presents an extended study of the

development, histology and behavior of the corpus luteum, the means of differentiating the same from that of gravidy, the biology of the yellow corpus, its influence on the pregnant and nonpregnant uterus and finally the possibility of impregnation from the influence of its hormone. Miller believes that a definite relation exists between ovulation and menstruation, and that the rupture of the Graafian follicle precedes the appearance of the hemorrhage by a period averaging nine days. While the ovum traverses the tube the membrana granulosa of the follicle is transformed into a corpus luteum, the epithelial character of which is shown by the history of its development, by the finding of colloid material within the lutein cells and by the demonstration of direct transitional elements. The fresh corpus luteum does not give any fat reaction and the latter can only be demonstrated after the beginning of the period of retrogression. The corpus luteum of pregnancy does not afford any specific staining reaction during its entire period. The corpus albicans is produced by the degeneration of the fatty lutein cells and hyaline degeneration of the connective-tissue reticulum. The differential diagnosis of the corpus luteum of pregnancy is rendered possible by the demonstration of colloid droplets and lime deposits in the presence of a negative fat test. The yellow body is a pathologically developing gland with an internal secretion which governs the cyclical transformation of the endometrium into a decidua. For this process the ovum is not necessary. The yellow body is an atrophic center for the uterus, stimulating the increased congestion of this organ during the period of fertility of the woman. In this way it exerts a favorable effect during the early months of pregnancy and prevents any new impregnation during its period of functional activity. The so-called lactation atrophy of the uterus is not a reflex trophoneurosis but merely results from the lack of corpus luteum formation. The demonstration of an internal secretion of the corpus luteum in the test-tube by the complement fixation method is impossible as hormones do not give rise to the formation of antibodies. Attempts to demonstrate the secretion of the yellow corpus luteum by vital staining methods have not succeeded thus far. Miller believes that the toxemias of pregnancy may possibly be produced by an insufficient function of this organ. Menstruation is an indicator of frustrated ovulation and represents merely relief of uterine hyperemia and has no influence on the results of conception. It is possible, however, that the menstrual blood represents the nutrient fluid from the ovum which is excreted during the degenerative process of the uterine decidua. Miller claims as the results of his observations that the most favorable period for the natural as well as the artificial impregnation, is the tenth day before the calculated appearance of a new period. He claims moreover, that the ovum of the last missed period is the one which becomes impregnated and that postmenstrual impregnation does not occur. The period of pregnancy is therefore to be reduced by nineteen days. In conclusion he presents the following scheme for demonstrating the physiological processes that occur in the life of every woman.

January 1, beginning of menstruation. January 19, the proper time for artificial impregnation. January 20, ovulation. January 20 to 27, formation of the corpus luteum, January 22, beginning of the functions of the corpus luteum and the formation of the premenstrual stage. January 27 to 29, implantation. January 29, beginning of menstruation and retrogression of the yellow corpus.

Cesarean Section in Double Ankylosis of the Hips.—Fuchs (*Monatschr. f. Geburtsh. u. Gynäk.*, Bd. xxxix, Hft. 4.) reports the case of a para-iii, thirty years of age, who as the result of a septic abortion followed by pyemic abscesses in both hip-joints, developed a complete ankylosis. The thigh could be flexed only 35 degrees and in addition abduction and rotation were interfered with to such an extent that the internal condyles could only be separated about 2.5 centimeters. When admitted to the hospital the fetus presented by the breech, membranes were unruptured and the patient was having pains. Delivery by the normal passages was impossible and Cesarean section with sterilization by the tubes was done. The mother made a good recovery and the child likewise. The author's search of the literature revealed only four instances of this complication in which the delivery by Cesarean section is necessarily indicated.

Dystocia Due To Enlargement of the Fetal Bladder.—Böhi (*Arch. f. Gynäk.*, Bd. ci, Hft. 3) describes a case in which the fetal bladder contained three liters of fluid and constituted an absolute interference with labor. The diagnosis was not made at the time but after puncture of the cystic mass, delivery was accomplished without difficulty. A very careful autopsy was made which is presented in its entirety. The bladder was found to consist of three portions of which the center had undergone a marked hypertrophy and hyperplasia of its muscular walls. The bladder was intimately connected with the musculature of the abdominal wall and by its size displaced the various abdominal and pelvic organs. The urethra was completely absent and this resulted in the extreme distention observed.

The Demonstration of Bactericidal Protective Ferments with the Abderhalden Procedure.—Fekete and Gal (*Monatschr. f. Geb. u. Gyn.*, January, 1914) have attempted to demonstrate these ferments in the infected organism by experiments in rabbits in which they used the technic of Abderhalden but employed albumin of bacterial in place of placental origin. They found that the normal blood of rabbits failed to show any digestive action that could be demonstrated by the dialyzation method of Abderhalden in the presence of colon or typhoid bacilli and staphylococci. In the serum of rabbits after the injection of killed bacteria, enzymes appeared, the digestive action of which can be demonstrated by this procedure. Such enzymes show variations although they are not sufficiently well-marked to afford any specific characteristics. Further experiments are necessary to prove whether in the human subject the infected organism is capable of showing a specific activity that could

be demonstrated by the dialyzation method which may eventually be employed for diagnostic purposes.

Kyphoscoliosis in Pregnancy, Labor and the Puerperium.—Vogt (*Arch. f. Gynäk.*, Bd. cii, Hft. 1) calls attention to the serious complications attending this deformity in the thoracic segment of the cord, especially in view of the danger of death from cardiac failure owing to extreme muscular exertion. In such cases not only the expansion of the lungs but that of the heart is decidedly interfered with and degenerative muscular conditions in this organ are frequently present. A considerable number of cases have now been reported in which this complication was present and from a study of these it may be stated that in extreme degrees of rhachitic kyphoscoliosis the first menstrual period usually appears comparatively late and in many instances the first pregnancy does not occur until after the thirtieth year. Spontaneous miscarriages and premature labors are frequently noted in these women. Evidences of cardiac insufficiency usually become prominent during pregnancy, particularly in the second half, although sometimes not until time of labor. In isolated cases acute cardiac failure may result during labor or within a few hours later. In the majority of cases the insufficiency of the heart does not manifest itself until the puerperium, when a complicating pulmonary lesion is most often the cause of death. In other cases of broken compensation during pregnancy which is not readily influenced by medication, the induction of labor should be considered and Vogt believes that the best method is by vaginal or abdominal Cesarean section. The prognosis for the children is not as a rule bad but hemorrhage during the third stage is very apt to be increased.

Adenoma of the Umbilicus.—Maurice Guibé (*Rev. de gyn. et de Chir. abd.*, April, 1914) says that adenoma of the umbilicus, although rare, is known to occur. The published cases have all been in women, except one doubtful one in a man. It occurs from the thirtieth to the fiftieth year of life. The tumors are of moderate size, oval or spherical, and located at the umbilical cicatrix. There are traces of hemorrhages in the stroma. True adenomatous tissue is disposed in cavities lined with epithelium containing a brownish liquid. The tumor grows slowly, and there is sometimes pain, and frequently hemorrhage into the tumor coincident with menstruation. The tumor may be regarded as originating from sweat glands, from the intestine, from the uterus, or from the peritoneum. It would seem strange that the tumor should arise from sweat glands at a point where there are no sweat glands in the skin. Menstrual hemorrhages should not occur in sweat glands. Intestinal origin would not explain the presence in the tumor of ciliated epithelium. The question of where the uterine débris would come from, which would cause adenoma to occur if of uterine origin, is pertinent. In all probability the last, the peritoneal origin, is the most likely. Under certain irritations flat peritoneal epithelium becomes cylindrical, or cubical; proliferation of cells with invagination of crosses of cells would prepare for the formation of the tumor. It is seen that none of

these theories is entirely satisfactory. Treatment consists of removal, which is quite simple.

Association of Uterine Growths with Goiter.—H. L. Elsner (*Amer. Jour. Med. Sci.*, 1914, cxlvii, 634) calls attention to the large proportion of uterine growths associated with typical and atypical exophthalmic goiter. He also emphasizes the frequency of the atypical cases, and urges thorough examination of all organs in the presence of goiters.

Massage in Gynecology.—Delassus (*Jour. des sci. méd. de Lille*, May 2 and 9, 1914) gives his experience in gynecological massage after thirty-three years of practice. He says that gynecological massage is a branch of kinesotherapy; movements may be active and passive. They are pressure, friction, tapotement, and vibrations, all executed lightly so as not to cause pain. It is used in two different conditions, for congestions and for anemia of the organs. For uterine inactivity and ovarian insufficiency causing amenorrhea, manipulations that cause congestion are used. The author has used massage mainly to relieve congestion with menorrhagia. The patient is placed on the back on a gynecological chair, with the legs flexed as for treatment. The clothing is loosened about the abdomen; a small pillow is placed under the sacrum. One finger of the left hand is introduced into the vagina, supporting the uterus as the right hand outside the abdomen manipulates the uterus. The right hand glides over the abdomen in a circle of 3 to 4 centimeters in diameter, which should produce no pain. If painful it will do no good and should be discontinued. Commence the movements at a distance from the lesion; for the ovary giving effleurage in the umbilical region, away from the navel. It is hard to make the patient believe that these slight movements will have so marked a curative effect. Deep abdominal massage demands more force. The great difficulty is to conquer the reflex resistance of the muscles. The internal hand presses lightly the vaginal wall, perivaginal, perimetrium and the base of the broad ligaments, gliding lightly over them, with movements from below upward and from the center outward, as if to empty the veins. In chronic, painful diseases much patience must be exercised. The resistance of the abdominal muscles must be overcome by distracting the attention of the patient. Indications for massage are in married women who have had several children, and who have become nervous and irritable, with painful menses, and tenderness of all the genital organs due to congestion. The first result is a sensation of lightness, less pain, less constipation, less tenderness to pressure; the uterus becomes smaller, more mobile, and sexual intercourse is more pleasant. It relieves edema of the tissues. Metritis may be treated in this manner. Displacements may also be treated in this way. Contraindications are acute conditions.

ITEM.

THE SEVENTH INTERNATIONAL CONGRESS FOR OBSTETRICS AND GYNECOLOGY will convene in New York City, U. S. A., on September 13, 1915, and the Scientific Session will be held on September 14, 15, 16, and 17, 1915.

An Executive Committee for each country, which has heretofore participated actively in the proceedings of the several congresses, has been appointed who will select reporters for their respective countries on the fixed symposia of the Congress, and will recommend to the Scientific Program Committee the names of others who are suitable to represent their respective countries on the program.

The International Organization Committee has decided that there will be one Scientific session each day from 9 to 10 o'clock and that the afternoons will be devoted to clinics, sight-seeing, excursions, etc.

The following is an outline of the Scientific Program:

First Theme: The Remote Results of Operations for the Relief of Retrodisplacements of the Uterus, both Simple and Complicated. Reporter, Prof. Th. H. Van der Velde, Haarlem, Holland.

Second Theme: The Treatment of Puerperal Infections. Reporter, Dr. Edward P. Davis, Philadelphia, Pa., U. S. A.

A prominent feature of the program will be: The Value of Radioactivity in Gynecological Therapeutics; 1st, Röntgen Ray; 2d, Radium; 3d, Mesothorium. This may be discussed in individual papers or in the form of reports.

Friday, September 17, Miscellaneous Papers.

National societies are encouraged to discuss these subjects at least eight months before the meeting of the Congress, and to have reporters collect and digest the discussions and report their conclusions.

DEPARTMENT OF PEDIATRICS.

TRANSACTIONS OF THE NEW YORK ACADEMY OF MEDICINE.

SECTION ON PEDIATRICS.

Meeting of May 14, 1914.

WILLIAM P. NORTHRUP, M. D., *in the Chair.*

PYLORIC SPASM.

DR. MARK S. REUBEN.—This patient is the youngest of three children. The first died of inanition at the age of three months and during life presented the same symptoms as the present patient except that they were more severe and persisted until death. The child probably had a hypertrophic stenosis of the pylorus. The second child is five years of age and has always been well. This patient came to our notice at the Vanderbilt Clinic at the age of eleven weeks; at six weeks he began to vomit, the vomiting being projectile in character and taking place from five to ten minutes after nursing. Constipation was obstinate and there was a steady loss in weight. At the first examination a pyloric tumor could be definitely made out and peristaltic waves were clearly visible. The diagnosis of pyloric obstruction was made. To ascertain the nature of the obstruction Dr. Hess was kind enough to try to enter the duodenum with his duodenal tube. After three or four attempts he succeeded, thus ruling out organic stenosis and making the diagnosis of pyloric spasm possible. Three hours after a nursing we were able to obtain 4 or 5 ounces of rancid stomach contents. An *x*-ray of the stomach showed delayed transmission of food. The infant was kept on the breast alone for four weeks, the intervals between feedings being three hours. Under this treatment the infant continued to lose in weight and all the symptoms persisted. An analysis of the stomach contents at this time showed a combined acidity of from 115 to 85, and no free hydrochloric acid. By weighing the infant before and after nursing we learned that he was getting from 4 to 5 ounces at a feeding and examination of the milk showed it to be of good quality. In spite of the fact that the breast milk was sufficient, after four weeks trial on the breast alone, we instituted complementary feeding, with the addition of 2 gr. sodium citrate to every ounce of milk used. Immediately the child began to gain in weight

and all the symptoms subsided. A pyloric tumor could no longer be felt and the peristaltic waves were no longer visible. The retention in the stomach gradually diminished and at present only about 1 ounce of stomach contents could be aspirated three hours after feeding. The combined acidity continued to be from 100-85 and now a trace of free hydrochloric acid was present. The points of interest in this case are: 1. There were two cases of pyloric obstruction in one family, both males; in one case the obstruction was of a high grade and led to a fatal termination, while in the other it was mild and led to speedy recovery. These cases lend proof to the theory of Dr. Holt who, I believe, is of the opinion that in all these cases there is a real stenosis and that spasm is a superimposed phenomenon, but that the stenosis varies in degree in different cases. 2. The almost immediate improvement when complementary feeding was instituted. 3. The disappearance of pyloric tumor when the child began to gain. 4. The persistence of the high acidity even when the infant was doing well, proving that the spasm was not due to the high acidity. 5. An x-ray of the stomach taken when the infant was doing well still showed much delayed transmission of food. Therefore too much reliance should not be had on the x-ray findings in these cases but rather more on the clinical phase.

CONGENITAL HYPERTROPHY OF THE LEFT HALF OF THE FACE IN A BOY SEVEN AND ONE-HALF YEARS OF AGE.

DR. SARA WELT-KAKELS.—The patient comes from healthy parents with no consanguinity, no history of lues or tuberculosis. There is another child, a girl two and one-half years of age, perfectly well. The patient was born at the end of a normal pregnancy; at birth the deformity of the face was noticed. The child was otherwise well developed. There was nothing abnormal in regard to dentition, time of walking, or of talking. The patient had whooping cough in his third year and measles when he was five and one-half years of age. He had occasionally suffered from sore throat, but has otherwise enjoyed good health. The facial hemihypertrophy has retained its initial proportions in relation to the right half of the face. The child is attending school and is one of the best pupils in his class. At present the enlargement of the left half of the face is mainly in the lower two-thirds, not only the soft parts, but also the bones being involved. The enlargement of the cheek is most prominent; the upper and lower lips of the same side are very much hypertrophied; the left angle of the mouth is drawn downward; the left nasolabial fold is effaced; the left half of the nose is larger; the skin over the affected side is normal; there is no hypertrichosis, or coarseness of the hair; in the malar region is a small telangiectasia about a quarter of an inch in diameter, surrounded by a small pigmented area. The action of the facial muscles is somewhat interfered with by the hypertrophy, but he can frown, laugh and whistle. There is a slight diminution in the response to the faradic current. There is no disturbance of sensibility or of the special senses. The examination

of the eyes reveals nothing abnormal. The vasomotor symptoms are absent; but sometimes there is salivation, seemingly from the left side. The mouth was mostly kept open, the left half projecting. The left half of the upper lip forms an ectropion. Very conspicuous is the appearance of the tongue, which is said to participate only in the congenital and not in the acquired form of facial hemihypertrophy. The point of the protruded tongue deviates to the right; its left half is easily four or five times larger than the right half. The left papillæ filiformes and fungiformes are very much enlarged. The left half of the hard and soft palate, the left tonsil, and submaxillary gland are also involved. On the inner surface of the left cheek, along the closure line of the teeth are a few small tumors of about pea size. Like the cheek they gave the impression of lipomatous growth. The left upper jaw is very much enlarged and thickened, especially in its alveolar portions. The teeth are irregularly inserted. The left half of the lower jaw is also enlarged, but to a slighter degree. The boy is otherwise fairly well developed. The thoracic and abdominal organs were normal, and the Wassermann reaction was negative. The reflexes are normal and there is no other asymmetry of the trunk or extremities. His intellect is good.

DR. M. M. STARK.—In view of the fact that the lipomatous tissue of the cheek and upper and lower lips is the seat of the maximum "giant" growth, exhibited in the very interesting case, it has seemed to me that this enormous hypertrophy is not without surgical possibilities, even though it is quite possible that subsequently, and after a long while, our initial result may have to be revised. That is to say, this being a case of local giant growth, it is quite possible, that even should some of the excess tissue be now removed, as it is proposed soon to do, there may be, in time, a re-growth of this tissue, again calling for its plastic removal. It is proposed to remove in several sittings enough of the excess tissue to give us for the present, and I hope for a long time, a good cosmetic result.

As Dr. Welt has said, all the histological elements in the region of the hypertrophy are involved in the giant growth. Now then, should at any time the bony structures take on extraordinary growth, any attempt at plastic correction would then be out of the question.

THE RÖNTGEN RAY AS A DIAGNOSTIC HELP TO THE PEDIATRIST.

DR. L. E. LEFETRA.—The value of the x -ray as an aid to diagnosis in surgical conditions that involve the bones and joints is too well known to require comment, while in abdominal and chest conditions in adults it has become a part of the routine of every large hospital and results have been gratifying in proportion to its greater employment and to the wider experience of the operators. In children the use of the x -ray in fractures, dislocations, rachitis, chondrodystrophy, tuberculosis and syphilis is thoroughly appreciated but there are also certain medical conditions in which the x -ray makes an early and positive diagnosis, which would not be possible otherwise, of which

I wish to speak. I will consider only such conditions as have come under my personal observation. Enlargement of the thymus gland has been found several times simply as an incident of thoracic examination when there was no cause to suspect it. Moreover the frequent fallacy of percussion in the diagnosis of the enlarged thymus has been demonstrated by the *x*-ray. In several instances plates taken for the purpose of showing the extent of an empyema have revealed a foreign body in the bronchus as the cause of the bronchopneumonic abscess in empyema. This has directed the treatment along proper lines and proved life-saving. For the detection of abscess of the lung and for determining the extent of empyema and also in the early diagnosis of pneumonia the *x*-ray has proved of the greatest value. In pneumonia where it was impossible by physical signs to localize the disease, the *x*-ray has shown with great delicacy the beginning of consolidation in most cases.

Pneumothorax is another condition which is most beautifully shown by the *x*-ray, and the plate may confirm or make a diagnosis otherwise unsuspected.

In miliary tuberculosis the *x*-ray and the von Pirquet test have transferred the diagnosis from a region of suspicion or conjecture into a realm of certainty. In addition to the miliary type of tuberculosis of the lung two other varieties have been shown, one apparently a tuberculous bronchopneumonia without consolidation, and the other a tuberculous pneumonia or bronchopneumonia with marked consolidation. Often unsuspected cavities have been found, usually near the apex and in very young infants.

For the diagnosis of pericardial effusion from cardiac enlargement the *x*-ray is of the greatest service, and also in showing us the best place for puncture of the pericardium. It also enables one to follow with greater accuracy the increase or diminution in the amount of pericardial fluid.

In the study of the alimentary canal the *x*-ray gives valuable information in regard to the stenosis of the esophagus, especially where this is spasmodic or cicatricial and it may also be of value in regard to stenosis of the pylorus, with regard to kinks of the intestine, or to the presence of megacolon. With reference to pyloric stenosis I think the *x*-ray is not at all essential and is often misleading.

For the diagnosis of early bone syphilis and for the differential diagnosis of syphilis from scurvy, and of syphilitic bone disease from tuberculous bone disease, particularly in cases of dactylitis or epiphysitis, the *x*-ray is of the greatest value.

AN APPLICATION OF THE RÖNTGEN RAY TO INFANT FEEDING.

DR. CHARLES HENDEE SMITH.—Radiography has several applications to infant feeding. The size, shape, and position of the stomach, its emptying time in health and disease, the effect on the emptying time of different foods, the proper amount of food and the interval of feeding have all been studied with Röntgen ray, and valuable information has been obtained. The point which I wish to bring

to your attention has to do with the management of the infant, and with the way in which food is given rather than with the exact composition of the food.

The teaching of doctors and nurses for many years has been that the child must be kept at the breast or bottle for twenty minutes, must then be held in a perfectly horizontal position, and be put to sleep at once without change of position. Many mothers do not follow this plan, but let the child take his food in a longer or shorter time than twenty minutes, hold him up against the shoulder after feeding, or prone across the knees, or trot him up and down in the sitting posture; finally after an interval putting him to sleep. One of these plans must be more desirable than the other. The posture of the child after feeding is of importance because of its relation to vomiting, colic, sleep, and general health.

The way in which posture can effect digestion depends first on the anatomy of the stomach. Radiography has shown the fallacy of the older idea that the stomach in infancy is vertical in position. The cardiac orifice of the stomach is held firmly to the posterior abdominal wall. The fundus lies in the left paravertebral groove, on the diaphragm, spleen, tail of the pancreas, kidney, and mesocolon, reaching a plane considerably posterior to the cardia, since the vertebræ project forward some distance into the abdominal cavity the pyloric end of the stomach is also pushed forward by the vertebræ, the head of the pancreas and the duodenum, and lies in contact with the anterior abdominal wall and liver anteriorly. The pyloric opening is directed backward to the duodenum, but lies in a somewhat more anterior plane than the cardia. There is therefore an obliquity of the long axis of the stomach from behind forward and to the right, as well as from above downward and to the right. The most posterior part of the stomach is the fundus, the most anterior that part of the body just to the left of the pyloric antrum. The cardiac opening is nearer the most posterior plane reached by the stomach than it is to the most anterior. The second factor in regard to posture is that there is a certain amount of gas in the stomach of every individual. Practically every radiograph taken in the erect position shows a bubble of gas in the fundus end of the stomach. In the prone position it is not possible to estimate accurately the amount of gas present.

The gas in the stomach may be derived from three sources, swallowed air, gastric fermentation, and intestinal gas. Gastric fermentation was rare and was only an important source when there was stagnation from obstructed pylorus or from gastric atony of extreme degree. Intestinal gas does not commonly pass back into the stomach. Swallowed air accounts for the gas in the stomach in the majority of cases. This takes place constantly. Air is constantly present in the pharynx and is forced down with the food at the time of each swallowing act. It is often possible to hear a child gulp down air with each swallow of milk. More or less air may be swallowed with saliva or nasal mucus between feedings. Tongue suckers, thumb suckers, and babies with "comforter" habit

suck and swallow air during a considerable part of their waking hours. The behavior of liquid in the stomach is not different from that in a glass bottle or other receptacle. If the child is held in the horizontal position the liquid gravitates to the posterior part of the stomach, that is to the fundus and forces the gas to the anterior part of the fundus and to the right end of the body of the stomach and pyloric antrum. Since the cardiac orifice is situated well back, against the vertebral column, it follows that it will be covered by the liquid and that the gas cannot escape into the esophagus. It can only escape through the pylorus, if at all. If the amount of food plus gas is enough to distend the stomach either food or gas must be forced out through the pylorus or food must be regurgitated through the esophagus until the tension is relieved on the stomach wall. This can be readily imitated by taking a bottle two-thirds full of liquid. When held on its side no air can escape through the bottle mouth; held upright the gas can escape with ease if under pressure. When the child is held upright the liquid gravitates at once to the dependent part of the stomach, displacing the gas to the highest point, that is the fundus, thus making it possible for the gas to escape by way of the esophagus. This often takes place as soon as the child is held erect.

Dr. Smith exhibited *x*-ray plates showing what happened when a child was fed and then placed in the ordinary horizontal position. The milk in the stomach had gravitated to the fundus and displaced the gas to the anterior portion of the stomach. The esophagus showed plainly as the child regurgitated food during the exposure. It was perfectly evident that no gas could possibly escape from the stomach until enough milk had been vomited to uncover the cardiac orifice of the stomach. The child was then held erect and the second exposure showed the effect of gravity on the stomach contents, the milk having gravitated to the dependent part of the stomach, the gas to the upper part, and it was now possible for it to escape. After the exposure the child was patted rather forcibly on the back and eructated gas. After ten minutes another exposure showed that the stomach had lost all its gas except a small bubble just at the cardia, and the stomach had contracted down on the milk and small amounts of bismuth had passed into the small intestine.

The horizontal prone position is better than the supine, because the liquid food gravitates to the anterior part of the stomach and forces the gas to the posterior part. This is perhaps why so many infants sleep better on their stomachs than on their backs. This is shown by a second series of radiograms.

The effect on the stomach of extreme distension seen in some cases must be unfavorable to digestion. The peristalsis can take place only with great difficulty, and it seems as though there must be interference with the secretion by pressure on the mucosa and the blood-vessels. The symptom "colic" is probably due in many cases to painful gastric distension, as well as to painful peristalsis. The frequency with which colic accompanies regurgitation is suggestive of their common origin.

The instinctive posture which many mothers assume when not taught otherwise by nurses or doctors, when they hold the baby up against the shoulder after nursing, is the one in which the baby can most easily get rid of this undesirable swallowed air. Patting on the back and slight pressure on the epigastrium may assist in the process of expulsion of gas. At times the eructation may be violent and the contraction of the stomach so forcible and rapid that a small amount of milk may come up with the air. The amount of regurgitation in such instances is negligible compared to the comfort given the baby. Very feeble babies often vomit whenever put down on their backs, the cardiac sphincter seemingly having no power. In some such cases this may be stopped by constantly keeping the basket or bed at an angle of about forty-five degrees, and never allowing the child to assume the horizontal position. The inverted position for nursing which has been suggested as a remedy for vomiting can have no influence except an unfavorable one on this form of vomiting. The horizontal position is, of course, not the only cause of vomiting; other causes must be eliminated in order to attain success by the postural treatment.

It is my belief that it is better for a child to take a feeding too rapidly than too slowly. Rapid nursing may choke the baby, cause coughing, gagging and vomiting, if the pharynx fills too rapidly, while slow feeding on the other hand, multiplies the number of swallowing acts and increases the amount of air taken. In nursing from very full breasts it has been shown that an infant may take 50 per cent. of the milk in the first two or three minutes, 75 per cent. in the first five minutes, and after that the amount per minute increased rapidly. Such infants showed no more signs of discomfort or indigestion than others unless they stayed at the empty breast sucking and swallowing air. Except in the case of feeble infants there is no good reason why a feeding might not be taken in five or ten minutes, and at most in fifteen rather than the traditional twenty. This is quite contrary to the usual teaching. Experience shows that the holes in a nipple must be made very small indeed to prevent a strong child from emptying it in ten minutes. It was much better to have four or five large holes so that the milk ran freely and to allow the baby to regulate the time himself. Puny infants sometimes became so discouraged from the effort of getting milk from a nipple with small holes that they refuse the bottle.

The writer has been testing this plan for six years and has yet to see a case of simple regurgitation which could not be relieved by these means. The teaching in practically all training schools for nurses has been that the baby should be kept in the horizontal position after nursing and must on no account be held up or moved about. During the past six years I have met only three nurses who had evolved their plan of holding the baby erect as a routine. Nurses train mothers now-a-days. The inexperienced mother takes the word of the trained nurse as law, and when a doctor and a nurse disagree, the doctor must have unusual influence over the mother to have an even chance of having his ideas carried out. In many

hospitals the babies are fed and allowed to lie without changing their position all day. This is a very bad practice. Dr. Northrup pointed out years ago that it was lack of holding in a mother's arms that made many babies do badly. Dr. Smith concluded that (1) regurgitation, colic, and indigestion depend not only on the food but on the manner in which it is given and the posture of the child between feedings; (2) the food must be of proper composition and of proper amount. It should be given at as long intervals as possible, depending on the gastric capacity and the total amount of food required per day; (3) a feeding should not be taken too slowly, five to ten minutes being long enough and fifteen minutes being the maximum time; (4) the child should be held upright before feeding to get rid of any gas in the stomach. If air is swallowed in large quantities it is often necessary to interrupt the feeding one or more times holding the child erect until the air has been expelled. Immediately after the feeding the child should be held upright against the mother's shoulder and given the opportunity to eructate gas; (5) the child should be placed in his bed preferably in the prone position with the head of the bed somewhat elevated. This routine may be followed with every child even though he does not regurgitate. Habitual tongue suckers have to be held up sometimes between feedings.

THE RÖNTGEN RAY AND PNEUMONIA.

DR. HOWARD H. MASON gave a lantern slide exhibit showing what the *x*-ray revealed in pneumonia. A number of the slides showed the correlation between the beginning of physical signs of pneumonia and the appearance of the shadow showing the beginning of consolidation. Other plates showed that with the disappearance of physical signs of pneumonia the shadow of consolidation cleared up. The *x*-ray has shown that when a lung clears it seems to clear equally all over and not from within outward or from without inward. Quite a change in the shadow is often noted within twenty-four hours. In all the early cases before the lung consolidated there was just dulness, but when consolidation extended to the larger bronchi one got all the signs of pneumonia, bronchial breathing, râles, etc. Still other plates showed that in bronchopneumonia the shadow was not in any way comparable to that of lobar pneumonia.

DISCUSSION ON DR. MASON'S PAPER.

DR. WILLIAM P. NORTHRUP.—I would like to ask Dr. Mason whether in the old-fashioned so-called central pneumonia it was an undiscovered marginal lobar pneumonia that we had?

DISCUSSION ON DR. MASON'S EXHIBIT.

DR. HOWARD H. MASON.—I believe it is like the case shown, usually in the region under the scapula and difficult to make out. There are dulness, breath sounds, and a few râles, but no bronchial breathing.

DR. WILLIAM P. NORTHRUP.—I am reminded of a case in my practice in which the child had a high temperature and slight stupor, in fact all the rational signs, but no local physical signs of pneumonia. The patient recovered by crisis and went on living. I had competent men in consultation with me and they all felt chagrined that they could find no local signs of disease.

DISCUSSION ON DR. MASON'S DEMONSTRATION.

DR. WARD BRYANT HOAG.—Why is there so much consolidation shown in lobar pneumonia while in typical pneumonia with high temperature, rapid respirations and bronchial breathing the *x*-ray does not show such marked shadows? In one case which came under my observation in which there were no physical signs on the sixth day, Dr. Kerley was called in consultation and he could make out no physical signs. On the seventh day we did not take the sounds but on the eighth day the child began to show physical signs and the first attempt to take the sounds with the stethoscope revealed the lesion and that same night the child's temperature fell from 106° to 96° F.

DR. I. S. HIRSCH.—In regard to the difference between bronchial and lobar pneumonia I do not quite agree with Dr. Mason. It is the general consensus of opinion that the pulmonary markings are due to lobar pneumonia to the blood vessels passing from the hilum to the periphery; the veins, arteries, and capillaries all take part and the density is due to the congestion of the blood-vessels. The bronchi in the *x*-ray picture seldom show except at the hilum and then but slightly in contrast to the thick shadow at the base. In pneumonia there are small spots showing the infiltration in the air vesicles. In all bronchial pneumonias there is a tendency to confluence and these small spots tend to coalesce. In lobar pneumonia there is an even density during hepatization and that serves to differentiate the lobar from the bronchial forms of pneumonia.

DR. WILLIAM P. NORTHRUP.—It is most illuminating to see what has been unearthed by the *x*-ray. In the Presbyterian Hospital Dr. Mason had a case of tuberculous meningitis in which the lungs showed no signs whatever of tuberculosis and yet the *x*-ray showed the lungs studded with miliary tubercules. The *x*-ray has certainly brought us a new and valuable aid in dealing with children's diseases. In this case just referred to at autopsy all the areas that the *x*-ray had indicated as affected were found to be involved.

MILIARY TUBERCULOSIS OF THE LUNGS.

DR. I. S. HIRSCH.—It is eminently proper that a physician should have read the paper on the value of the Röntgen ray as a help in diagnosis since the *x*-ray specialist might be suspected of allowing his enthusiasm to run away with him.

The slides exhibited demonstrated instances in which the *x*-ray had revealed the location of a foreign body in cases when there were

no signs or symptoms that pointed to a definite localization. A röntgenogram was shown in which a nail in the bronchi was so lodged that it was very difficult to remove. The fluoroscope was sometimes more useful than the bronchoscope in effecting the removal of such an object.

In regard to the bronchial lymph nodes, the *x*-ray does not show these unless they are markedly enlarged. In some instances where the *x*-ray showed no enlargement the lymph nodes were found enlarged at autopsy and in others where the *x*-ray had seemed to show enlargement there was none.

Other röntgenograms illustrated cases in which the *x*-ray had made the diagnosis of miliary tuberculosis where the physical signs and symptoms had not been sufficient to warrant the diagnosis and cases in which a suspected miliary tuberculosis was conformed by the *x*-ray.

RÖNTGENOGRAMS ILLUSTRATING BIRTH FRACTURES AND ATRESIA OF THE ESOPHAGUS.

DR. EDWARD D. TRUESDELL.—The first slide shown illustrated atresia of the esophagus. The baby from whom the picture was taken was a full term child. When he came to nurse he had peculiar attacks of choking and cyanosis. The child was looked over carefully but we could make no diagnosis until an attempt was made to pass the catheter into the stomach. This could not be done and the *x*-ray showed the catheter in the blind pouch which ended at the bifurcation of the trachea and the cricoid cartilage. The second plate showed an exactly similar condition. Pressure deformities with birth fractures of the skull were shown. They had never met with a fissure fracture, all the fractures being depressions similar to the depressions made by pressure in a ping-pong ball. Illustrations were shown of microcephalus, with the receding frontal bone and irregularities of ossification and also illustrations of tardy ossification. Dr. Truesdell said he had seen ten birth fractures of the clavicle but these showed no particular feature. Several of them were bilateral but in all union took place. They usually put them up in a figure of eight or a Velpeau bandage. Of particular interest as showing what nature could do in the restoration of these injuries was a series of plates showing an angular deformity of the humerus resulting from a fracture without displacement. At the end of two weeks there was firm union but a marked angular deformity. Successive plates showed the angulation becoming less and less, and at the age of two years the humerus was practically normal. The same thing has been shown to occur in other instances. Other plates showed fracture in cases with Erb's paralysis, fractures of the femur, and syphilitic periostitis.

THYMUS OBSTRUCTION.

DR. FREDERICK M. LAW.—The first plate was taken fifteen minutes after death and the condition was confirmed by autopsy. The

child had been operated on for cleft palate, the operation lasting one-half hour. The child was returned to bed and six hours after the operation was all right. The nurse observed him at that time and turned to care for a child in the adjoining bed. A few moments later she looked at the child and he was dead, having died without a struggle. The plate shows the enlarged thymus holding down over the heart. This was a case of status lymphaticus.

A second plate also showed an enlarged thymus.

TYPES OF INFANT STOMACH.

DR. LEON THEODORE LEWALD.—The first plate exhibited showed an intussusception in an infant. The exact location was not apparent from the physical examination as the tumor could not be made out. The *x*-ray showed the precise location of the intussusception so that the incision could be made directly over it, and on inspection the intussusception was found to be exactly where the *x*-ray had indicated.

Dr. Le Wald exhibited a number of röntgenograms showing the variations in size, shape, emptying time, and the amount of gas in different stomachs of infants. The supreme test of stomach function in infants as in adults is the emptying time. Even peculiarly shaped stomachs are able to empty themselves in a reasonable length of time. The *x*-ray was sometimes a positive help in making the differential diagnosis between pylorospasm and pyloric stenosis, and in deciding whether an operation was necessary or not. The röntgenograms from one case showed a small amount of food passing the pylorus. This case went without operation and got well. On the other hand, in another instance it was found that nothing had passed the pylorus in twenty-five minutes and even at the end of an hour nothing had passed and it was decided that operation was necessary.

Two illustrations of congenital syphilitic stomachs were shown. Both children gave a marked Wassermann reaction. In one of these cases there was a cicatricial area in the lower half of the stomach and an enteroanastomosis was done. The child did well for about a week when she began to vomit and another *x*-ray examination gave the clue to the trouble. The esophagus was found to be very much dilated on account of the small cardiac pouch and by feeding small quantities of food the child finally recovered.

Röntgenograms taken two years or more after operation for congenital pyloric stenosis showed the food passing through the gastroenterostomy opening. If one can decide on the proper cases for operation one need not hesitate to operate since the results are shown to be very satisfactory.

TRANSACTIONS OF THE AMERICAN PEDIATRIC SOCIETY.

Twenty-sixth Annual Meeting, Held at Stockbridge, Mass., May 26, 27, 28, 1914.

The President, SAMUEL MCC. HAMILL, M. D., in the Chair.

PRESIDENT'S ADDRESS.

DR. HAMILL first paid a tribute to the memories of Dr. Forchheimer, Dr. Rotch, and Dr. Putnam. He said that as friends they would miss them, but that they should miss much more their stimulating influence in the Society, and above all their contributions to the subject of pediatrics and the betterment of the world. As a text for his remarks he took a quotation from the first volume of the Transactions of the Society, quoted from Dr. Jacobi's first epistle to the Pediatricians, written in the year 1888 on the occasion of the first scientific meeting of the American Pediatric Society. It read: "Questions of Public Hygiene and Medicine are both professional and social. Thus every physician is by destiny a "political being" in the sense in which the ancients defined that term; viz., a citizen of the commonwealth, with many rights and great responsibilities." In that communication, after defining at length the close interdependence of pediatrics to general medicine, surgery, neurology and to all other branches of medicine, he emphasized the relationship of pediatrics to the most vital questions of public hygiene. The speaker quoted further from Dr. Jacobi's paper of 26 years ago which indicated in very definite terms what he thought to be the duty of this society and its individual members to the problems of the commonwealth. Though Dr. Jacobi had been the pioneer in pointing out this duty of the American Pediatric Society, others had from time to time suggested that the American Pediatric Society, primarily founded to stimulate and encourage scientific work to the highest degree, should assume broader obligations and grapple with larger problems. In the light of the standing of this organization had they the right to refuse consideration of the vital problems of preventive medicine that were being unwisely and irrationally disposed of by men and women who were often swayed by sentiment and who were without the knowledge of medicine, upon which, in the final analysis, every problem relating to the child must rest. In answering this question affirmatively, Dr. Hamill said he would not convey the impression that the American Pediatric Society should sacrifice one particle of its scientific endeavor along lines of

laboratory and clinical research, but that it should add to its program scientific investigation along the lines of preventive medicine as it applied to the welfare of the child. The subjects of birth registration, the regulation of the midwife, the problems presented by the day nursery and the foundling institution, and the problems of school hygiene all demanded their attention. Many of the private schools for boys and the great majority of girls' schools, as housed in our cities, are a menace to the public health. They are receiving neither advice nor supervision.

The problems of the physician and the sociologist are inseparable. This, the speaker said, was well illustrated in the matter of the health aspects of the "Child Labor" problem. As Dr. Rotch had pointed out, the knowledge which the pediatricist alone could give would prevent the enactment of laws which were unwise and unjust both to the child and to his parents and employer. The health departments of some of our cities had made special provisions for the care of the city child by the creation of departments of "Child Hygiene" and this Society should do all in its power to stimulate the creation of such departments, rightly conducted, that the terrific morbidity and mortality among infants and children would be reduced. Much of the invalidism of the adult, mental and physical, much of the moral obliquity of the child and the adult, had as their foundation the neglect of the medical aspect of these sociological problems.

As to our method of procedure, the suggestion of Dr. Edsall that this Society act as a center for the accumulation and dissemination of knowledge relating to these subjects was admirable. They could not treat all of the innumerable themes that were awaiting them at once, but these could be brought up one by one at the yearly meetings. Dr. Hamill, therefore recommended that at the present meeting three committees of three members each be appointed—the first to study the present status of the Child Labor problem, and to present a critical and constructive report at the next annual meeting; the second to study the vulvovaginitis problem in its relationship to public health, its report to be submitted at the same meeting; and the third to be known as the Committee on Cooperation with the Children's Bureau of the United States Department of Labor.

THE USE OF DAHLIA.

DR. JOHN RUHRAH, Baltimore.—For a long time aniline dyes have been known to exert a certain antiseptic action and certain practical applications have been made as a result. As early as 1886 Pfeffer showed the effects of certain aniline dyes upon the cells of the higher plants and in the following year Rozeahegyi pointed out their harmful action upon certain bacteria. He also observed the selective action of the dyes. Stilling showed that the dye not only exerted an antiseptic action but also actually killed certain bacteria, and at his request the firm of Merck and Company put out a mixture of methyl violet 6B dahlia and benzyl violet. This was called blue pyoctanin. The curative action of aniline was known to workers

in dye factories where it was the custom to treat skin wounds by dusting them with various dyes. The selective action of these dyes led to their use in culture media and Drigalski and Conradi used crystal violet in dilution of 1-100,000 in a culture medium designed for the isolation of the typhoid bacillus. Churchman in the *Journal of Experimental Medicine*, (Vol. XVI, pp. 221 and 822 and Vol. XVII, p. 373) recently published details of a study of the effect of gentian violet upon various bacteria, and found that the various forms of organisms could be separated into violet positive and violet negative, or those in which the growth was inhibited and those in which it was not inhibited. For almost all bacteria this relation of the growth to gentian violet is quite constant. Simon and Wood have shown that an acid dye irrespective of its color in the standard concentration of 1-100,000 is devoid of bactericidal properties while a basic dye likewise irrespective of its color may possess inhibitory power. Simon and Wood state that this inhibitory effect upon the growth of bacteria is not referable to color but to chemical structure (triamino triphenylmethanes). In another contribution Simon and Wood show that the inhibitory action upon the growth of certain bacteria which has been demonstrated to be common to all the triaminotriphenyl methanes is not an exclusive property of this group of aniline dyes but is manifested also to a greater or less extent by other strongly basic dyes. They have also demonstrated that certain bacteria belonging to groups ordinarily susceptible to dyes may grow in their presence and many organisms overcome the susceptibility by adaptation. This has also been announced from Ehrlich's laboratory. May and Heidingsfeld in studying fuchsin found essentially the same thing, that is, that the most basic, rosalin acetate, is also the most toxic for bacteria, while the acid fuchsins are not toxic at all. They found that 1-1000 solution of basic fuchsin killed in five minutes typhoid, paratyphoid, tubercle bacilli, staphylococci, and the *oidium albicans*. They also found that the 1 per cent. solution did not produce any irritation of the mucous membranes and could even be injected into the bladder. They found further that 1 per cent. ointments could be used in the treatment of ulcers and abrasions. Stronger ointments would occasionally produce some irritation. They suggested that the base of the ointment be made of five parts petrolatum and five parts lanolin. Two years ago in searching for an efficient local application for streptococcus infections of the throat Dr. Charles Simon suggested dahlia. I started with it as a local application, beginning at first with very weak solutions and soon found that the saturated solution, that is about a 4 per cent. solution, could be applied to the mucous membranes of the throat or any other part of the body without producing either pain or subsequent irritation. The drug seems to penetrate only a short distance and for the deeper affections has no value, but for superficial involvements of the mucous membranes whether due to streptococcus or to other organisms the effect was quite striking. In some cases very little effect was noted, but in others there was a marked lessening of the intensity of the inflammation and coincidentally a marked

lessening of the constitutional symptoms. It has the advantage over other applications in that it is not painful, does not produce irritation and is markedly antiseptic. Its only disadvantage is its color. For ulcerations about the mouth it may be used by applying a saturated solution or a mouth wash varying in strength from 1 to 1,000 or 1 to 10,000. The dahlia not only kills the offending organism but has a marked stimulating effect on the healing. I have used it with remarkable effect on vaccinations that were slow in healing, and upon other abraded surfaces, particularly those which were infected. While I have not had the opportunity of using it in erysipelas, others have used it with satisfactory results in a number of instances. Dr. Johnson of Baltimore has informed me that he has used it with success in both acute and chronic eczema, in herpes, tinea tonsurans and furunculosis. In one resistant case of tinea sycosis the patient was cured after five or six daily applications. It may be used with reasonable hope of success in skin lesions caused by or accompanied with pus organisms.

DISCUSSION.

DR. L. EMMETT HOLT, New York.—Have you used dahlia in diphtheria?

DR. RUHRAH.—In a few cases we have used lactic acid and in some of them it did well. We used a 5 per cent. solution.

DR. CHARLES GILMORE KERLEY, New York.—I would like to ask Dr. Ruhrah if he has used this in poison ivy.

DR. RUHRAH.—I have not used it, but it would do no harm to try it.

DR. ABRAHAM JACOBI, New York.—I wish to refer to a paper published some eight years ago, in 1906, I believe, in the *Journal of the American Medical Association* on the effect of methyl blue in cases of cancer. The paper called attention to the advantages of methyl blue in chronic cancer by giving it, not subcutaneously, but internally. This paper has been overlooked and neglected in a very conscientious manner as many good things are. I have used methyl blue for twenty-three years and am still satisfied with it.

THE DIAGNOSIS OF WHOOPING COUGH BY THE COMPLEMENT DEVIATION TEST.

DR. ALFRED FRIEDLANDER, Cincinnati.—The purpose of this preliminary report is to record the fact that we have succeeded in making the diagnosis of whooping cough in all stages—catarrhal, paroxysmal, and convalescent—by means of the complement deviation test. Early diagnosis is important both in the control of the spread of this infection and in the effects to be derived from the vaccine treatment, as it is a matter of record that the success of vaccine therapy depends in a large measure on the time of its application. The earlier the vaccine is given, the better the results. After describing in detail his technic (*Journal of the American Medical Association*,

March 28, 1914) Dr. Friedlander stated that this test had been used in eighteen cases of whooping cough with a positive result in every case; in eight normal children with a negative result in every instance; in three cases in the catarrhal stage, with two positive and one negative result; and in one case not whooping but in every other respect typical of the disease, with a positive result. It was of interest to note that nine of the positive cases were in the first week of the whoop, and three early in the second week. Every case examined in the paroxysmal stage had given a positive result. In no case had they obtained a positive reaction when the patient did not have the disease or else had had a pertussis infection or a history of pertussis within four years. Our results lead us to the opinion that the complement deviation test is of the greatest value in the diagnosis of whooping cough. With the method used it has been possible to make a diagnosis of pertussis in the catarrhal stage.

DISCUSSION.

DR. ROWLAND G. FREEMAN, New York.—This work seems very promising but the general impression seems to be that we are still uncertain as to whether we have really found the specific organism of whooping cough. In one laboratory in New York they have been experimenting all winter but with no results.

DR. KERLEY, New York.—I had the opportunity last summer to meet Dr. Freeman of London. He has used the vaccine on 1134 cases and in each case had established a control and his opinion was rather vague as to the results. He thought it probably did some good. He gave it in doses of two million twice a week. Used in conjunction with the pneumococcus vaccine he thought it gave good results.

DR. SAMUEL S. ADAMS, Washington, D. C.—It seems to me that the point as to the value of this test hinges on the early diagnosis: usually before the doctor sees the child it has become a menace to many. Was there a history in these cases? Was there a history of disturbed sleep; this symptom usually appears long before other symptoms. The child sleeps for an hour or so and then has a paroxysm of coughing. He goes to sleep for an hour or two longer and then has another. It seems that if this test is to be of value we must get the child before there is a distinct history.

DR. HOLT, New York.—The close correspondence between influenza and whooping cough makes it desirable to differentiate them bacteriologically. We have had much influenza in the Babies' Hospital during the past winter and took cultures from all the inmates of the institution and found the influenza organism in a large proportion of cases. The resident physician had the symptoms of whooping cough but the influenza bacillus was isolated from cultures of his sputum. This close resemblance of whooping cough to influenza in some cases may account for the negative result in the case reported in this series.

DR. FRIEDLANDER, Cincinnati.—In reference to Dr. Talbot's question as to how long the children had been coughing, three cases had

been coughing three days; three, four days; some, a week; some, ten days. The cases were carefully selected; most of them were in the wards of the City Hospital. When a child showed any definite history of cough the test was made and the normals had some cough.

In some the diagnosis of influenza according to Dr. Holt's statements was made. I do not think one can any longer question the specificity of the Bordet-Gengou bacillus. We have been using it in three strains and got a definite deviation of the complement in each. So far as the value of the vaccines is concerned there is room for doubt. Relatively small doses have been used and one gets no result from fifty to one hundred million. Using six hundred million one gets no bad effects.

ENDOCARDITIS IN CHILDREN

DR. FLOYD M. CRANDALL, New York.—It is not my purpose to present a systematic monograph on heart disease in children, but rather to record certain views reached after many years of observation. Last year Dr. Dunn read before this Society an admirable paper on 300 cases of heart disease seen in hospital practice. In reading that paper it seemed to me that one on the same subject from a different point of view might be of value. This paper is based not on statistics but on personal experience. These conclusions are not based on impressions and memory alone, which form a very uncertain basis for medical opinion, but on the study of case histories of private patients, some of whom have been followed for many years. My general conclusion is that cardiac disease in private practice runs a considerably more favorable course than it does in hospital and dispensary practice. I am well aware in selecting the title "Endocarditis" that in the graver forms of the disease which come to autopsy the disease is never limited to the endocardium alone, but that the pericardium and the myocardium are also involved. It is undoubtedly true that a certain amount of degeneration of the fibers of the heart muscle occurs during the course of every acute febrile disease or intoxication. In watching the course of these cases, it is difficult to believe that in some of less severe types, which run a favorable course, any marked degree of myocarditis or pericarditis is present. It certainly seems that a poison like that of rheumatism circulating in the blood may so irritate the sensitive myocardium as to cause the primary lesion in that membrane rendering the designation endocarditis proper. The probability of grave myocarditis, however, must never be forgotten. Examinations for its detection should be frequent and careful, for upon it more than upon any other element depends the prognosis and much of the treatment. I have come to rely upon four symptoms as particularly suggestive of muscle involvement. The earliest to appear is irregular heart action or palpitation, and usually this is the most distinctive symptom. Syncope is characteristic of decided myocarditis, particularly in diphtheria. In addition to these two symptoms, cyanosis and precordial distress are very suggestive of

muscle involvement. One or more of these symptoms in conjunction with physical signs warrants us in the belief that in addition to the endocardial disease, we have also muscle involvement. In the later stages the occurrence of cyanosis and edema is of more grave significance in children than in adults. They indicate a grave type of carditis, certainly endocardial and myocardial, and perhaps pericardial as well. It is usually impossible in a young child to determine the condition of the heart muscle unless an examination can be made during sleep as well as during waking hours. If anemia is found to be marked the prognosis may not be so gloomy, for its relief may directly mitigate the symptoms. A point of great interest has been the occasional rapidity of the development of the physical signs of endocarditis. I have heard a loud endocardial murmur develop in a closely watched case within eighteen hours. It is not always the fact that a soft indefinite murmur precedes the development of distinctive sounds. It is possible that the advent of fever with increased heart's action may sometimes aid in the apparent rapid development of endocardial lesions. It is a common statement that the severity of the case is not in proportion to the sounds heard on auscultation. If the murmurs are judged as they should be in connection with other signs, then the statement is not wholly true. Other things being equal, I find it difficult to feel that a loud rasping murmur is not more serious than a soft blowing one. The final course of these cardiac cases is always of great interest and moment. The patient in whom the disease begins before the age of twelve years has a very important period before him. The physician who ignores the gravity of a cardiac murmur and lightly says that the child will grow out of it, is taking almost a criminal risk. It is quite true that during this period some children do change for the better. In two such cases coming under my observation, following an acute endocarditis in which I had concluded that the murmur was not likely to disappear, it had disappeared and the heart gave evidence of being in a normal condition. The myocardium had in both cases not apparently been involved, and the compensation had been excellent. The unfortunate opposite in my experience has been the more frequent result. In general terms my experience leads me to agree with Dunn that the earlier the primary endocarditis occurs, the better is the ultimate prognosis, because of the more perfect adaptation of the child to the heart and the heart to the child. In the matter of prognosis I am not willing to agree with the proposition that the number of murmurs is not to be taken into consideration. The patient with a mitral regurgitant murmur alone, other things being equal, has a much better outlook than the one with a double mitral murmur and vastly better than one with an aortic murmur. An aortic lesion is a very dangerous thing in a child, but aortic insufficiency is fortunately rare in children. There is too much tendency in statistical papers to make out tables on one element alone. We cannot safely do that in practice. The evil effects of anemia upon the child with cardiac disease can scarcely be overstated. It is a contributing factor to weakness and fatty

degeneration of the heart muscle. The chlorotic type common in girls over the age of fourteen should be watched for and vigorously combated by diet, moderate out-door exercise, and medication. The sources of infection of acute rheumatism and the portals of entrance are still somewhat uncertain. The evidence against the tonsils is very strong. The reasons for the removal of infected tonsils in a rheumatic child are therefore vastly greater than in any other constitutional type. In my experience the type of tonsillitis marked by a grayish exudate upon soft spongy-looking tonsil is more serious than the type of tonsillitis marked by clear, white pearly spots and a throat comparatively clean. I have been unable to demonstrate any relation between quinsy and rheumatism. The effect of endocarditis on the growth and development of the child have been of particular interest to me. There are certain of the more grave cases, particularly those of decided rheumatic tendency with recurring attacks, which do not develop well. It has seemed that the constitutional tendency and the rheumatic involvement were often more important factors than the heart lesion. I have seen child after child with a distinctly blowing murmur develop in a perfectly normal manner. When the compensation is good there seems to be no reason why this should be otherwise.

The treatment of endocarditis divides itself into two distinct stages, that of the acute and that of the chronic condition. I have become more and more impressed with the importance of absolute rest in bed in the early stages. It is not sufficient to keep the child in bed during the febrile stage alone. Six weeks is the shortest time that any endocardial case may be safely permitted to leave the bed. I would arbitrarily place the time at two months and beyond that be guided by symptoms. Two symptoms are of special value in determining this point, namely rapidity and regularity of the heart's action. I do not consent to the child's leaving the bed until his pulse is well below 100 and is regular. If it becomes irregular or unduly rapid on moderate exercise I insist upon continuing the quiet. The rapidity on exertion must, however, be looked upon with some judgment. A child who has been several weeks in bed is certain to show more rapidity of pulse than one who has been leading an active life, and it is often a question how much importance should be attached to increased frequency of the pulse on first efforts, if it continue regular. The management of the acute stage has been a comparatively simple matter. The education of the family has often been more difficult than the treatment of the patient, the families being prone to go to one extreme or the other. They either ignore your advice or else restrict the child unduly. After the child is out of bed with a murmur left behind many difficult problems present themselves and the management often settles itself to one of judgment alone. I am more and more convinced that to maintain the restrictive treatment too long and too rigidly after the preliminary stage is a mistake. Too much confinement to the house and restriction of muscular exercise may defeat its own object. In regard to the exercises that may be permitted, the action of the heart under exercise is the most

reliable guide. If it becomes irregular or unduly rapid, there should be no hesitation in forbidding the more strenuous exercises. A period of daily rest is of great importance to the cardiac child. After the acute stages are passed we have to deal with a condition rather than a disease. In the management of this condition arbitrary rules may do harm, rather than good. In few other conditions is it more essential that we study the case and treat the patient rather than the disease.

DISCUSSION.

DR. HENRY DWIGHT CHAPIN, New York.—One feature in connection with these cases is that some have a tendency to acute dilatation under great stress. In young athletes who are under great strain permanent damage is sometimes done. The advice of the physician is not sought in matters pertaining to athletics; they are under the charge of a director who is often ignorant of the dangers of undue stress. This matter is in line with the address of our president this morning. This is one of the places where the physician has a duty to the public; he should have more to say about the strenuous exercises which our schools and colleges encourage.

DR. HENRY I. BOWDITCH, Boston.—I just wish to bear out what Dr. Chapin has said and to emphasize the connection which he brought out in regard to address of Dr. Hamill. The child with a damaged heart does not have a fair show in life and needs the closest observation, and a committee to take up this subject would be productive of good results. As one observes more closely one sees how the family history plays a part in these cases. There are often other cases of endocarditis in the family, and it would be interesting to note the association with streptococcal infection of the tonsils.

DR. FRITZ B. TALBOT, Boston.—The history of a case of endocarditis that I have seen within the past few days showed that the sister had had rheumatism and endocarditis three weeks before. If the family history of these cases is studied more closely it would more often be found that there either were or had been other cases in the same family. The statement was made that children in private practice have a better chance than those of the poor. We have been running a heart hospital and have had good results. Rest in bed for from six weeks to two months is rather too short a time for the majority of cases. In our work we are trying to see what the social workers can do in the matter of keeping these children in bed in their homes. Both hospital and home care under a social worker are efficient, but I cannot say which is better. However, many can be properly cared for in their homes.

DR. J. P. CROZER GRIFFITH, Philadelphia.—Dr. Crandall has said that an increase in irregularity and rapidity on getting up is an indication that the patient should remain in bed. It is possible that where there is a certain degree of debility the patient may be kept in bed longer than he should be. It seems to me that these patients may be divided into three classes: 1. A small class where there is absolute failure of compensation. 2. A larger class which respond

well to treatment and in which recovery usually follows. 3. A class in which there is a tendency to an independent anemia, not yielding readily to treatment. There are heart cases that have anemia which, in spite of arsenic, etc., still remains discouraging.

DR. A. D. BLACKADER, Montreal.—One of the speakers referred to the effect of rheumatic endocarditis on the development of the child. This is a point that has interested me. It has been pointed out that growth is dependent on wide arteries and low blood pressure. A slight endocarditis by lowering the blood pressure and favoring wider arteries favors and increase in growth, and these children may be found a little taller than other children in the family. Another point, not mentioned in the text-books, is the giving of small doses of potassium iodide in these cases of endocarditis in children. When the temperature has become normal for a week or so small doses of potassium iodide may be given for three, four, or five weeks. Its effects on acidosis are well known and it is believed to have some effect on the viscosity of the blood. In regard to the after treatment of cases in which endocarditis has developed, this must be a matter of judgment. In many cases with slight lesions without much interference with the pulse or breathing, the children many go ahead without much thought of the heart. Such mild lesions are usually confined to the mitral valve. Excepting for the more strenuous exercises such children during the period of their general development should be permitted to develop the heart as well as the rest of the body.

DR. HENRY L. COIT, Newark.—The writer of the paper said that these children with endocarditis should be kept in bed six or eight weeks and may get up when the pulse is 100. The susceptibility of the pulse in children makes it important for us to know whether he means 100 standing or 100 recumbent.

DR. ISAAC A. ABT, Chicago.—The reader of the paper spoke of the rarity of aortic lesions in children. Aortic lesions are not as rare as has been supposed. In my personal experience I have been seeing an increasing number of these cases. Occasionally in children with murmurs there is slight temporary cardiac dilatation after exercise, perhaps lasting for a period of days. What should one do in regard to exercise in these cases? It is very difficult to keep a boy in bed in this condition who wants to play and there is no absolute rule that can be laid down. It is really a matter of what is best for the individual case; if there is considerable dilatation of course one should be careful.

DR. FREEMAN, New York.—No one has spoken of the value of the *x*-ray in the control of these cases of endocarditis. Cases that show great enlargement should be subjected to an *x*-ray examination when they show an improvement in symptoms. One case that has come under my observation seemed to be gaining and was allowed to get up. The child then ran a temperature and a second *x*-ray picture showed the condition worse than when the first was taken. In the management of these cases of endocarditis one should be controlled more by the *x*-ray than by clinical examination.

DR. D. J. MILTON MILLER, Atlantic City.—There are a small number of adventitious murmurs not due to endocarditis but which are exceedingly difficult to diagnose. The child may be delicate and have a cardiac murmur at the base or sometimes at the apex and it is difficult to satisfy oneself as to the nature of the murmur. These cases are frequently let go without treatment and some times disastrously. In cases of endocarditis in children small doses of morphine are valuable especially when there is nervousness.

DR. PERCIVAL EATON, Pittsburg.—Dr Crandall touched a little on anemia and I would like to suggest the longer administration of iron as one of the helps in this condition. I think we sometimes keep these children in bed too long. In many cases the heart can be trained to fit the needs of the child. One is apt to forget how much can be done by beginning with a very little exercise and gradually increasing it.

DR. BOWDITCH.—In regard to inheritance or a family predisposition to this condition the following history is of interest. A mother had endocarditis. The oldest son of her first daughter also had it. The second daughter had a marked endocarditis and her oldest child had two attacks, probably due to infection through the tonsils. A third daughter showed symptoms of the condition but her oldest son has an endocarditis probably from the tonsils. What the predisposition of the grandchildren had to do with the development of their condition I do not know but I feel that it had something to do with it.

DR. FRANK S. CHURCHILL, Chicago.—Was the blood pressure taken in these cases and what was it? Was it different in the organic and the functional murmurs? Was it less when the children were lying down than when sitting up and less when sitting than when standing? On lying down was the murmur transmitted to the axilla? These were questions that it would be interesting to have answered. One could get around the prolonged rest in bed by passive exercises. The question of allowing the child up when the pulse was 100 or less depends on the age of the child and the blood pressure.

DR. L. E. LAFETRA, New York.—The family tendency to endocarditis may be explained by the tendency of the lymphoid tissue to infection being handed down from one generation to another. It seems to me that the blood pressure can be used as a guide along with the pulse rate to determine when one may allow the patient out of bed. Often after exercise for the first two or three days after the child is up the heart will be rapid but after a few days the heart gets its second wind, so to speak, and then goes along all right.

DR. HERBERT B. WILCOX, New York.—The anemia is the one thing in these cases that is amenable to treatment. One should get these children into the country. We have a hospital branch in the country and last summer sent thirteen cases with severe lesions. They were kept under the observation of a member of the staff and received no treatment other than careful hygienic supervision. Only one had returned to the clinic for treatment. Most of them were permanently improved by this method. This showed why

better results were obtained in the families of the wealthy than in those of the poor.

DR. FLOYD M. CRANDALL, New York.—Many of these children will, if in bed too long in poor surroundings, get hospitalism. It is well not to center the child's mind on his condition. In order to avoid calling too much attention to the heart I often make the excuse of examining for a cough when I am observing the heart. Often one cannot tell much about the heart unless the child is asleep. In connection with the relation of a family history of rheumatism in these cases, a family came under observation at the Polyclinic Hospital in which there were seventeen cousins and every one of them had either chorea, endocarditis or rheumatism.

TREATMENT OF RECURRENT SIBILANT BRONCHITIS.

DR. B. K. RACHFORD, Cincinnati.—It is my belief that the symptom groups commonly described in the literature under the titles migraine, recurrent vomiting, recurrent sibilant bronchitis, recurrent coryza, asthma, and urticaria, as they occur in children are, as a rule, closely related food intoxications which can be successfully treated by very much the same dietetic and medical treatment. In a paper read before this Society in 1897 I expressed very much the same views that I am reiterating to-day. It is not my purpose at the present time to express an opinion as to the character or the method of action of the various toxins which may bring about the above-mentioned symptom groups. The objects of this paper are: First, to call attention to the clinical fact that recurrent rhinitis and recurrent sibilant bronchitis, which are sometimes associated with severe asthmatic attacks, and almost always with a severe paroxysmal cough, are very commonly caused by some kind of food intoxication. Second, to direct attention to the fact that recurrent attacks of rhinitis and whistling bronchitis, which is one of the most common symptom groups the physician is called upon to treat, may be in most instances almost or quite relieved by dietetic treatment. Third, to insist that this symptom group occurs not infrequently in children who have a predisposition to migraine, recurrent vomiting, and urticaria. The case histories given show this relationship. As to the treatment of recurrent rhinitis and recurrent sibilant bronchitis and asthma, we may first consider the dietetic management. During the attack, sweets, fats, eggs, and raw fruits are especially to be avoided. Strawberries, rhubarb, tomatoes, salads, shellfish, tea, coffee, pastry, gravies, cream, codliver oil, and alcohol are excluded from the diet. If it be necessary to sweeten the cereals and cooked fruits which the child eats, saccharin is to be used instead of sugar, and while the patient is not to have butter, skimmed milk may be allowed. Eggs in every form, even in cooked foods, are to be carefully eliminated from the diet, and among the raw fruits oranges are especially to be avoided. The following foods may be allowed: beef, mutton, fowl and fish in moderation, cereals, bread, all vegetables not above prescribed, cooked fruits, skimmed milk and thick

soups. About two months after the patient has recovered from the attack the above diet may be carefully modified by adding one egg a day to the diet, then perhaps two weeks later milk containing 4 per cent. fat. Some few weeks later small quantities of sugar may be added for sweetening cereals and cooked fruit. After five or six months the child may return to his original diet with the exception that he must eat sparingly of sweets and must eat nothing between meals. If the symptom group returns on the addition of any article of diet that particular food is to be excluded from the diet. During the attack the patient is to have all the outdoor air he can get with as little exercise as possible. As he recovers from his attack, exercise in the open air is advisable. It is especially important that school children who spend a portion of the day in the close atmosphere of the schoolroom should have all the air possible at night. As to the medical treatment, during the attack constipation should be relieved by some magnesium salts. The milk of magnesia or calcined magnesia are especially suitable for this purpose. Sulphate of magnesia may be used in small doses in older children. Alkalies in the form of bicarbonate of soda, bicarbonate of potash, or citrate of potash should be given in fair-sized doses three or four times a day. Bicarbonate of soda may be given for example in 5-grain capsules three or four times a day, or the same sized dose of citrate of potash may be given in solution. In younger children I direct the mother to distribute through the infant's food a teaspoonful of this salt each day. Tincture of belladonna should be given for a short time in two- to four-minim doses three times a day. In the intervals the belladonna is discontinued but an alkali of some form should be given for six or eight weeks. Bicarbonate of soda is best for this purpose and may be given in moderate-sized doses once or twice a day. This treatment is quite as effective in the treatment of migraine and recurrent vomiting in children. In the adult and older child I continue to use the treatment of migraine which I originated twenty years ago and which is as follows: Sodii sulphatis (dry) 30 grains; sodii salicylates (from wintergreen) 10 grains; magnesii sulphatis 50 grains; lithii benzoatis 5 grains; tincturæ nucis vomicæ three drops; aquæ distil. to make 4 ounces. This prescription is put up in siphons and charged with carbonic acid and the patient is directed to take one-half hour before breakfast, a sufficient quantity to produce at least one bowel movement during the day. This prescription is a remedy of great value in the prevention of migraine, and in fact may replace all other medication in that condition.

DR. PERCIVAL J. EATON, Pittsburgh.—I take it from the paper that by sibilant bronchitis Dr. Rachford means that form in which sibilant râles are mixed with the so-called asthmatic râles. Last year I saw ten cases similar to those Dr. Rachford describes; during the past winter I have seen from 90 to 100 but I had no suspicion that they were dietetic in origin. I felt that an element had come into these cases which I had not seen before. We found that urotropin acted quickly. I have had cases in nurslings and in children of all ages up to seven or eight years, the majority, however, were

among children from six months to two years of age. These cases were new to us in Western Pennsylvania and Ohio whether they were due to infection or to diet, though the latter is a new idea.

DR. FRITZ B. TALBOT, Boston.—Dr. Schloss has given an answer as to the cause of the condition under discussion in his excellent article presented to the New York Academy of Medicine about two years ago on "Egg Anaphylaxis." I remember a case in which there was egg anaphylaxis and asthma and when immunity to egg was effected the asthma was also cured. I feel sure that this condition is a question of anaphylaxis. There may be anaphylaxis to other articles of diet besides eggs. One patient under my care could not eat eggs and had a sibilant bronchitis and I started with doses of one-sixty-fourth of a grain of egg in capsule and even this small dose produced a reaction every time it was administered. Dr. Rachford has struck the cause of a great many of these cases and we all have found that they may be caused by different sorts of food.

DR. GODFREY R. PISEK, New York.—According to what the doctors have said Dr. Rachford's treatment is only palliative; the real treatment must reach the causative factor. It is not sufficient to stop egg alone but one must stop all foods which contain egg as well. Some foods such as acid foods bring out an intolerance for certain other foods and each case must be studied from the individual standpoint.

DR. HENRY L. COIT, Newark.—Many cases with anaphylaxis for eggs have also an anaphylaxis for macaroni. The following case seems to be in line with what Dr. Rachford has just said. In this case it was necessary to transfer the child from milk to a diet in which the carbohydrates would be in the form of starch and cereal. One teaspoonful of wheat jelly was given and caused a rise in temperature, vomiting and prostration. I urged the mother to try again and the result was disastrous. After two weeks the experiment was repeated and there was a recurrence of prostration and vomiting. I then attempted to overcome the anaphylaxis by vaccinating the child with a minute quantity. This was a case of wheat anaphylaxis and Park also thought it was. The child now takes cereal jelly and vegetables.

DR. WALTER LESTER CARR, New York.—I would like to endorse Dr. Rachford's paper. Many of these children are more susceptible to infection especially with influenza; these belong to the so-called lithemic type and one frequently finds them with deviated septum, enlarged tonsils, etc. One child that came under my observation could ride on a pony without bringing on an asthmatic attack but got one if he went into a stable. The children having this instability do better if starved as in enteritis. They may be given either skimmed milk, or lactic acid skimmed milk, and should have general dietetic management.

DR. ISAAC A. ABT, Chicago.—During the reading of the paper I was much reminded of the descriptions given under the designation of "exudative diathesis," a condition in which there is a predisposing constitutional state associated with certain definite symptoms.

Under this term Czerny includes exudative inflammatory conditions which may manifest themselves as eczema, scrofula, recurrent bronchitis, asthma, urticaria, etc. The symptoms may become more pronounced after eating milk or eggs or after a mild infection. One must not consider this predisposition a simple anaphylaxis. Many children tolerate milk and eggs in large quantities while others do not. The latter class tolerate starches and may detoxicate, after taking too much milk or eggs, on starches.

DR. KERLEY, New York.—Before the New York State Society I read a similar paper and gave Dr. Rachford the credit of priority. At that time I presented six cases of children affected with recurrent bronchitis and three with an associated asthma. These conditions were different from infectious colds; children do not get infectious colds so often. These children may have an infection but the colds are not infectious *per se*, but are nearly always associated with a lithemic, rheumatic or gouty history. In these conditions the carbohydrates are at fault; and the children were relieved and gained from 3 to 6 pounds in weight by the elimination of carbohydrate in the form of sugar and fat from the diet. They could get the necessary amount of carbohydrates out of the ordinary starches and vegetables. Cream was also eliminated. Milk is a highly energized form of food and I do not allow more than 1 pint of skimmed milk daily in these cases. In addition to the dietetic treatment citrate of soda was given and the bowels kept open by a suitable laxative. I have had some flat failures; in a number of instances because the treatment was not properly carried out, but the majority of cases have been benefited by this scheme of treatment.

DR. SAMUEL S. ADAMS, Washington.—It seems to me the question is one of simple idiosyncrasy; we have all known of instances of idiosyncrasy to quinine, to strawberries and to other articles of food or drugs and the problem consists in finding out which the article is for which the idiosyncrasy exists and eliminating it. When I was twenty-one years of age I developed a vasomotor catarrh and found out that pineapple caused it. In these cases we should, instead of seeking the mysterious and scientific, come back to first principles and take that article which is causing the trouble out of the diet.

DR. MILLER, Atlantic City.—There seems to be some factor other than food which causes external irritation in some of these cases. Some children cannot live at the seashore. If they go to the mountains they will be all right but as soon as they return to the seashore they have a recurrence of the irritation.

DR. RUHRAH, Baltimore.—It seems to me we have confused two things, anaphylaxis and acid intoxication.

DR. PERCIVAL J. EATON, Pittsburg.—My cases were breast-fed and anaphylaxis did not come in. I have had under observation children who could not take egg and wherever egg struck the hand or face there was a red spot. The cases to which I referred were probably not the class of cases to which Dr. Rachford refers; mine were acute infections, probably influenza or streptococcus infection.

DR. R. K. RACHFORD, Cincinnati.—The question of alkalinity has been mentioned. In my paper I called attention to the fact that magnesium salts helped to fix the alkali in the tissues. The alkalinity is better kept up when soda and magnesia are combined. I have acted on this principle and find it true. I purposely avoided the term anaphylaxis in the paper, though it is used in the text-books in this relation and Dr. Meltzer has recently published a paper on the "Relation of Anaphylaxis to Certain Cases of Asthma." In this paper he refers to egg anaphylaxis and other forms of anaphylaxis in their relation to asthma. In reference to what Dr. Pisek said, that my treatment was palliative rather than curative, one might not always be certain of the cause of the trouble, but these cases responded almost immediately to the alkaline treatment. This was continued and the dieting was kept up, and after a time one could begin experimenting with foods. When the point is reached where one of the food stuffs causes a return of the symptoms then that article must be eliminated for a time or permanently. I also purposely avoided the etiological factors in this condition. Every child is not susceptible, perhaps the proportion is one in ten or one in twenty. I avoided the predisposing causes because we do not know them.

MEMORIAL TO THOMAS MORGAN ROTCH.

DR. ABRAHAM JACOBI presented this memorial. He said that in 1873 Rotch wrote the "Emigration of the White Corpuscle in Inflammation," an essay to which was awarded the first prize by the Boylston Medical Society for 1873, and in 1878 "Absence of Resonance in the Fifth Right Intercostal Space, Diagnostic of Pericardial Effusion." The first impressed him as the work of a young man (he was born in 1849) given to study and scientific erudition; the second told of good observation and practical tact. In 1880, at Richmond, the Section on Pediatrics of the American Medical Association was formed of which he was made secretary. The American Pediatric Society was formed in 1888 and he was its second president. You are not unacquainted with the great influence Dr. Thomas M. Rotch has wielded in the American Medicine, which had to overcome more obstacles than in any country on the face of the globe with the exception of Great Britain.

After his return from Europe in 1876, when he studied in Vienna, Berlin and Heidelberg, Dr. Rotch practised medicine in Boston always with a view to benefiting the welfare of children and the teaching of their physiology and diseases. The Pediatric Department of Harvard University owes him everything. This university was the first in America to establish a chair of pediatrics as a proper reward for his incessant labors in that branch of medicine. It happened in connection with that fact and is characteristic of his modesty that Rotch asserted that the administration of Harvard was induced to raise that chair to a professorship only by the appreciative mention of pediatric work in the first volume of Keating's

Cyclopedia. The list of his medical writings is too voluminous to reiterate. Among the numerous positions that he held were the following: Professor of Pediatrics of Harvard University, Consulting Physician to the Boston City Hospital, Visiting Physician to the Children's Hospital, Medical Director of the Infant's Hospital, Consulting Physician to the Infant's Hospital. He was a member of this and many other medical organizations.

Dr. Rotch is one of those whose greatness was won by hard work in a limited sphere. He appreciated the boundary lines restricting everybody, but felt from the beginning of his career the necessity of constructive work. That is why a large number of his papers are dedicated to the subject of infant feeding. His call to present to the British Medical Association what was considered the American method of infant feeding was the first proof of the impression his personality and teaching had made far and wide together with the foundation in London of a milk laboratory like that established by Rotch in Boston. It is well known to you all that the first Boston laboratory was not initiated until Rotch had proved to the profession in New York and other cities the desirability of high-grade clean milk for infant feeding. That example became the teacher of the profession and the public. Dr. Dunn, in the Boston Medical and Surgical Journal, says of him, "For the last twenty years Dr. Rotch was much interested in developing the work of the infant hospital, the first in this country to admit patients restricted to the first two years of life. This was only part of the initiative work of Dr. Rotch.

It must be left to those who are intimate with his daily life and emotions to record in appropriate terms and with sufficient energy the great merits of Rotch in connection with this teaching and working in the two large hospitals he controlled. Now the number of constructive clinicians in this country is not large, not one should be buried in silence, least of them a man who has genuine and permanent merit. These were his vast knowledge, enthusiastic industry, clear and logical expression, and other gifts of a great clinical leader. These gifts were increasingly developed with every year of his teaching life. The disproportionate chapters of his great "Pediatrics" was improved from year to year. Gradually it became a book of greater usefulness and proper proportions. With years of learning, guided by his watchful brain he became more statesmanlike in his views and researches. His big book the "Living Anatomy and Pathology of Early Life" was pervaded by a humane and humanistic study of the growing child. He gave a distinct discrimination between the actual and chronological age of the growing child, insisting upon the cautious examination of a child wishing or compelled to do manual labor, according to the anatomical development of his body as exhibited by his osseous growth. It is exactly that class of research and that class of students that will prove the blessing of science and sociology. It is quite possible that Rotch will be remembered by the permanent influence his hospital will exert on the health of thousands of patients and on the ever living stimulation

students and doctors will derive from his creations. This influence I estimate much higher than the immediate good done to the sick. His value to the profession is greater than that which would come from similar work performed by one equally gifted or more personally ambitious. Dr. Rotch was a general practitioner, a great teacher, and to his work he added the outflow of his kind and humane heart, and the appreciation of the fact that only good men can be great and good doctors. That is what Hippocrates meant when he said that where there is love of our calling there is love of mankind, or Nothnagel when he said before closing his eyes: "Only a good man will be a good doctor." That is what Rotch *did*. Though being given to inveterate research he never swerved to follow it from the dictates of conscience and humanity. No man who does research work alone, laboratory work, on dead tissue alone, will ever rival in his results the warm-hearted person who studies the eye of the patient who is under observation, and estimates the innermost folds of a man's heart who clamors for relief. The human suffering body is to men like Rotch much more than a physiological makeup.

There is still more to Rotch's credit. There are those who disagree with him in regard to his theories and teaching on the feeding of babies. Those here and outside who find fault with him should not forget what they inherited from him before he died. Our inheritance is the impressive teaching of the necessity of studying the infant and the child. He belongs to the few who taught pediatrics because they could not help it. No disposition of his own made him shoulder the hard work of accomplishing his beneficial ends. Let no body forget that it was he among a few who in America raised pediatrics to the rank of a scientific and humane practice. Dr. Jacobi said he wished his American Colleagues would soon appreciate the fact that the young men you send to certain European centers to learn medical science and morals find their goal quite often after their return, when meeting the good and great men sequestered in this and other scientific bodies.

A CLINICAL STUDY OF TYPHOID FEVER IN CHILDREN.

DR. HENRY DWIGHT CHAPIN, New York.—The fact that children are not supposed to be very susceptible to typhoid fever, and, when affected, are apt to exhibit an irregular type of the disease, would seem to render a study of cases of value for future comparison and reference. It is during epidemics that they are most likely to be attacked and during the fall of 1913 an epidemic of typhoid fever occurred on the lower East Side of New York City, including 521 reported cases with a mortality of 11.7 per cent. Many children were attacked as shown by the following; A little over three-fifths of all the cases in the epidemic were in children under fourteen years of age. Dr. Osler in reporting on 1500 cases of typhoid fever in Johns Hopkins states that 231 were under fifteen years of age. Dr. Ogan of the New York Board of Health in a study of 1500 cases in 1912 to compare with Dr. Osler's statistics found 437 under fifteen years

of age. Children under twelve years of age constitute about one-fourth the population of New York City and approximately one-fourth of all cases of typhoid fever occurred under twelve years, so that children contribute their fair ratio to this disease. It is evident that we must revise our ideas as to the frequency with which this disease occurs in children.

Its incidence in the epidemic was as follows: Under five years of age, thirty-six; from five to nine years, ninety-eight; ten to fourteen, eighty-seven. The epidemic was finally traced to the milk supply and this probably accounts for the large number of children attacked. The eleven cases here reported were treated in the children's wards of the Post-Graduate Hospital. The ages were as follows: two, three, four and five years, two cases each; six years, three cases; eight years, one case.

The duration of the fever including the period before admission, was very varied and ran from the shortest to the longest period as follows: 7 days, 11 days, 16 days, 18 days, 19 days (two cases), 20 days, 21 days, 33 days, 42 days. In only five cases did the temperature run very high during the active stage, two reaching 106° F.; one, 105.2° F. and two ranging from 104° to 105° F. The temperatures in the other cases were not high and were distinctly remittent toward the close of the disease. The diagnosis was confirmed in every instance by a positive Widal test and no case showed any rose spots. A study of the blood is given in the table and shows that in general the red corpuscles are about normal in numbers. There is no appreciable diminution of the leukocytes except in one case, a child of four years, when they numbered only 4200. These cases thus failed to show the leucopenia that was supposed to accompany typhoid fever. In the differential count, a study of the polymorphonuclears showed what might be considered a polynucleosis when one had in mind the age of the cases. In every instance the percentage is appreciably higher than the average for the age. The lymphocyte count was more irregular, being normal in only one case. In two cases it was above normal and in eight below normal for the age of the child. In two of the cases the relative diminution was very marked. A study of the urine showed that the kidneys were not much affected in this series. The gastrointestinal symptoms were neither marked nor severe. Vomiting was noted at the onset in four cases, diarrhea in five, constipation in five, and one showed no abnormality. They seemed both to enjoy and to digest the generous diet that was given. For a number of years the idea has been gaining ground that typhoid-fever patients were being fed on too exclusively weak and liquid diet. Some patients could not take sufficient milk or other fluid nourishment to repair the waste caused by the fever and keep up general vitality. It must be remembered that all digestible food is in liquid form when it passes from the duodenum into the ileum, and the feces, consisting largely of dead bacilli, epithelial cells and secretions from the bowels, usually only become solid in the lower part of the colon. It is difficult to see how such material can have any appreciable effect on ulcers usually located

in the ileo-cecal region. The children were allowed the general ward diet with the exception of meat. This included milk, cocoa, eggs, bread, toast, crackers, cereals, jelly, potatoes, gravy, broths, custard, junket, apple sauce, orange juice, ice-cream and lady fingers. They received nourishment once every three hours. An effort was made to give them forty calories per kilo body weight per day, but in not a single instance was it possible to make them take the full required number of calories through the febrile stage. In some instances sugar of milk or malt sugar was added to the liquids in order to increase the total caloric value of the food but this also failed, since the children refused to take it. Dr. Dennett who had this feature of the work in charge concluded that while from the theoretical standpoint it would be beneficial to have them take the required number of calories it was not practical to carry out the caloric feeding in these cases, since children, unlike adults, could not be forced to take food. Of these eleven cases, seven gained in weight during the fever, two showed a very slight loss, and two an appreciable loss. The most remarkable case occurred in a child of three years who showed a gain of eight pounds after a fever lasting nineteen days. There were no severe complications and no relapses. Under the former may be noted two cases of tonsillitis, two of otitis media, one hypostatic pneumonia, one pyelitis, and one severe bronchitis. Without a knowledge of the epidemic and the use of the Widal test it is doubtful if most of these cases would have been properly diagnosed. In no case was the spleen palpable. The patients came in with the following diagnoses: probable typhoid fever in five cases, Brill's disease, one case; meningitis, one case; miliary tuberculosis, one case; bronchitis, one case; no diagnosis, two cases. The children entering with a typhoid diagnosis came from families in which others were suffering from this disease.

DISCUSSION.

DR. HOLT.—How long did the patients remain in the house or how long was their residence in the hospital?

DR. CHAPIN.—Three or four weeks.

DR. ADAMS.—In an analysis of 550 cases in the Children's Hospital under Dr. Acker it was found that the children were taking about all the foods Dr. Chapin mentioned. There is no doubt but that the children do better under the modern method of feeding and that there are fewer intestinal hemorrhages and ulcers. Some doubt has been expressed as to the occurrence of typhoid fever in children under two years of age, but during the past two years I have seen infants and very young children with typical attacks. One point in favor of the present method of feeding is the absence of wailing and crying for food; the children are never hungry. The child has to have a certain number of caloric units and if they were not supplied to him he has to get them from himself. It was not until Shattuck and others advised increasing the diet of typhoid fever patients and adopted it themselves that we have realized the value of this method.

Typhoid fever has never been a rare disease in the District of Columbia and it has long been recognized in children. W. McPherson recognized it in children in the 70's and we see typical attacks in infants five and six months old.

DR. LA FETRA.—I have a paper on this subject tomorrow but I wish to say a word about the calories. Dr. Chapin said they had had difficulty in getting the children to take forty calories per kilo body weight. We found that after a few days forty or fifty calories were readily taken and sometimes two or three times that amount was taken with benefit.

DR. JACOBI.—The reason you did not see typhoid fever in very young infants was because your hospital did not admit such young children. Is this not so? There are a few cases on record of typhoid fever in the newly born and in very young infants. I recall one case thirty-five years ago in a baby fifteen days old. At autopsy ulcers and Peyer's patches were found. That these are sometimes not apparent may be due to the fact that Peyer's patches are not so well developed in very young infants. I have heard of several other such cases and those in hospitals that admit babies at an early age may have seen them. We should not forget the work of Dr. Coleman who has done so much to put our doubts as to the value of the high caloric diet further and further away.

CIRCUMCISION IN MASTURBATION IN FEMALE INFANTS.

DR. ROWLAND G. FREEMAN, New York.—The masturbation of female infants while not common occurs with moderate frequency and is a condition which if neglected leads to a considerable amount of depravity. It may be controlled by proper treatment. In the female infant there exists fairly regularly marked adhesions between the sensitive clitoris and the surrounding tissues so that on examination the clitoris is frequently found to be buried in these adhesions. In a normal robust child they seem to cause little irritation but in the nervous, sensitive child they may cause intense irritation and lead to the formation of a habit which, if untreated, may become permanent and exert a most injurious influence over the future development of the child. The treatment of this condition is both general and local. The general health should be improved by such hygienic measures as are available and all sources of nervous irritation and excitement should be as far as possible removed, but no cure can permanently be accomplished by these means alone. The only curative treatment is that applied to the removal of the source of irritation, the adhesions of the clitoris. These may be separated without the use of an anesthetic. The operation under these conditions is very painful and is apt to be followed by the formation of other adhesions. The only satisfactory method of treating this condition is by circumcision, an operation which should be performed by one accustomed to doing it, the foreskin being removed as completely as possible. The result of this operation is most satisfactory. In many cases no recurrence of the habit is noticed, while in others

recurrence will occur but is usually found to be due to adhesions which have reformed notwithstanding the circumcision. More attention should be paid to the hygiene of this region in all young girls with symptoms of nervous irritability. The histories of these cases are not always clear. The real condition is often misunderstood by the parents, but where masturbation exists a clear history of an orgasm can be obtained after close observation on the part of the attendants. (Illustrative cases were cited.) In several cases circumcision and the removal of adenoids at the same time effected a complete cure. In several other cases adhesions reformed after operation and the habit recurred necessitating a second breaking up of the adhesions. In some instances it may be necessary to break up adhesions several times before a cure is effected.

DISCUSSION.

DR. JACOBI.—I would like to ask Dr. Freeman if he thinks that every case of masturbation in a female infant is caused by adhesions of the clitoris, if every case is the result of an anatomical anomaly?

DR. R. FREEMAN.—All the cases that I know of were.

DR. JACOBI.—This paper is to me a revelation in that it shows a new cause of masturbation, but I want to refer to the many causes of irritation that may lead to the formation of this habit. Such irritation may be caused by bad constipation, fissure of the anus, the presence of oxyuris, or to vaginal catarrh which in many cases is the result of neglect and uncleanness. Or, again, the irritation may be the result of an oxyuris travelling into the vagina, or to a cystitis, though this is not common; or to a pyelitis, now recognized very frequently, whereas twelve or fifteen years ago it was considered very unusual. Again, stone in the kidney may be the cause of peripheral irritation, and this is by no means a rare condition in infants. There are so many causes that may lead to masturbation that I am glad to know that there is another for which I must watch. In my experience masturbation is a disease very frequent before the end of the first year and it may last for years.

Second Day, Wednesday, May 27, 1914.

INFANTILE SCORBUTUS AND THE PASTEURIZATION OF MILK.

DR. JOHN LOVETT MORSE, Boston.—In a paper published in the Boston Medical and Surgical Journal, April 2, 1914, I called attention to the rapid and progressive increase in the number of cases of scurvy coming to the Medical Out-Patient Department of the Children's Hospital during the four years ending in 1913, and to the coincident increase in the amount of pasteurized milk used in Boston during this period. A table showing the number of new cases coming to the hospital, the number of cases of scurvy, the percentage of scurvy, and the percentage using pasteurized milk, shows that while in 1904 among 2579 new cases coming to the hospital there were

three cases of scurvy, or a percentage of 0.11, while in the year 1913 among 2416 cases coming to the hospital there were twenty-one cases of scurvy, or 0.87 per cent. The records thus far in 1914 show that the high percentage of cases of scorbutus have thus far been maintained. The increase during the past five years over the previous years since 1904 is especially marked. A study of the table shows that a much smaller proportion of the cases afflicted with scurvy in 1913 were fed on the proprietary foods than was the case ten years ago. One of the babies which developed scurvy was fed on the breast and one on condensed milk. In three others there was no data as to what milk was used or whether a proprietary food was used with it, or whether it was heated or not. In four a proprietary food was used with the milk, the mixture being boiled or pasteurized. The remainder were fed on milk modified in some way. In one a mixture made with pasteurized milk was also boiled. The table showing the food which the babies who developed scurvy were taking in 1914 shows that the modifications were all reasonable ones. There could be little doubt judging from these figures, that there really had been an increase in the number of cases of scurvy in Boston during recent years. They do not prove, however, that this increase has been due to the introduction of and the progressive use of the commercial pasteurized milk. Neither do they prove that the heating of the milk, whether to a temperature of pasteurization or of boiling, has anything to do with the etiology of scurvy. They do suggest, however, that there may be some such connection, and seem to justify further study along these lines.

DISCUSSION.

DR. HENRY JOHN GERSTENBURGER, Cleveland, Ohio.—What were your results in treating these cases, especially was any change made in the quality or heating of the milk, and what did you do in regard to the feeding of orange juice? I had one case on casein milk and I simply added orange juice to the diet without changing the milk and the child improved rapidly.

DR. MILLER, Atlantic City.—Dr. Morse's contention that scurvy is on the increase corresponds with my recent experience. I have seen twelve cases in the last two years in private practice. A few years ago Dr. Northrup spoke about this subject and he raised the point that scurvy was frequently not recognized by the average family physician. A number of years ago they were very much alive to it and every one saw it, but later they seemed to have forgotten all about it, and now attention has again been attracted to it and more cases are being recognized. In five of my cases there was a history of bi-pasteurization of milk. The mothers had pasteurized milk that had already been pasteurized. I would like to call attention to the fact that in the history of his life in the Arctic region Stapleton states that when the fat gave out the men of the company had ravenous appetites which lean meat failed to satisfy and some of them developed scurvy, but as soon as a supply of fat was secured their appetites returned to normal and the scurvy disappeared.

This seemed to indicate that a diet not properly balanced might be a factor in the production of scurvy.

DR. BLACKADER, Montreal.—I have had an experience in Montreal similar to that of Dr. Morse in Boston. I have seen an increasing number of cases for the past two years and especially last winter. I did not alter the food but added orange juice.

DR. WILLIAM P. NORTHRUP, New York.—In the paper to which Dr. Morse referred I emphasized the fact that often after the milk had been pasteurized the lady of the house gave it another boil. The newer practitioners do not know scurvy as the older ones did.

DR. ABT, Chicago.—I want to introduce into the discussion some experiments on animals. Pigeons fed on cereals developed polyneuritis; guinea-pigs fed on cereals have a peculiar susceptibility to scurvy. Guinea-pigs fed on raw milk have extra brittle bones. Some fed on milk heated at a temperature of 60° to 112° C. get scurvy and those fed on oatmeal and raw milk did not show the disease. Milk heated to 90° C. to which oatmeal was added showed antiscorbutic properties. This brought up the question whether cereal can be considered a factor in the production of scurvy.

DR. CRANDALL, New York.—The apparent increase in the number of cases of scurvy might be due to the fact that the present generation is not as alive to this disease as the previous one. This subject formerly was a very popular one for medical literature. Certain diseases are popular in the literature for a time and then one does not hear much of them for a while. I have been surprised that so little has been said in regard to scurvy in recent years. Twenty years ago one heard a great deal on this subject.

DR. THOMAS S. SOUTHWORTH, New York.—While the practice of using pasteurized milk has become very common it is also true that the giving of orange juice has increased during the past twenty years and this opens up the question whether we should have a much larger amount of scurvy with this habit.

DR. ROWLAND G. FREEMAN, New York.—In New York City the Board of Health has almost prohibited the sale of raw milk so that almost all the milk there is pasteurized and yet there is no scurvy. I have not seen a case all winter.

DR. GODFREY R. PISEK, New York.—I would like to confirm what Dr. Freeman has just said in regard to the absence of scurvy in New York. I have not seen a case this last year. I wonder whether the form of pasteurization has something to do with the production of scurvy, its being done in a modern scientific laboratory. Dr. Morse did not tell us anything about the effects of artificial foods.

DR. HENRY HEIMAN, New York.—I would like to confirm what has just been said. I have not seen a case of scurvy in New York recently. It is not due so much to pasteurized milk as to artificial foods; scurvy is a form of poisoning. I have seen scurvy after the use of pasteurized milk and equally as much follows other forms of feeding. Scurvy is on the decrease in New York City.

DR. J. P. CROZER GRIFFITH, Philadelphia.—I would like to call attention to the investigation of this subject by a special committee.

They found that there was nothing wrong with the food but they did not get much further. A change of food was what was needed but they could not predicate what change. Ten cases occurred in infants that were breastfed and no one knew what was wrong. Cases that get scurvy on raw milk did well when put on modified milk in certain instances. There must be a scientific basis to account for this condition, but we are not in a position to blame pasteurized milk, sterilized milk, or anything else. It was noticed as long as ten years ago that babies got scurvy when fed on artificial foods, just as they do now on the modern pasteurized milk. Now proprietary foods are not used so much and the only constant factor is commercial pasteurized milk.

DR. SAMUEL MCHAMILL, Philadelphia.—I would like to ask Dr. Morse if he knows the temperature at which the milk was pasteurized in these cases of scurvy. We must be careful in regard to our statements about pasteurized milk when it is so necessary to pasteurize it in order to protect children.

DR. MORSE, Boston.—The milk was pasteurized in different ways in these cases and possibly some of it was not pasteurized. As to the orange juice, all were given orange juice; sometimes they did not change the food but allowed the baby to have the same kind of food but stopped heating it. With regard to the failure to recognize the disease, physicians ought to know more about it than formerly as much attention was paid to this subject in Harvard. I cannot understand the difference in the frequency between New York and Boston. I did not wish to make any claim that heating the milk is a cause of scurvy; I said this was a possible explanation. After looking over the literature I have to confess that there is nothing in the evidence that pasteurization has any effect on the nutrition, yet here are the figures and we find something that we have not explained either theoretically or practically. We do not know the cause of scurvy; we know that something is wrong and it is ours to find out what.

EXPERIENCES WITH THE HIGH CALORIC DIET IN TYPHOID FEVER OF INFANTS AND YOUNG CHILDREN.

DR. L. E. LAFETRA AND DR. LOUIS C. SCHROEDER, New York.—The loss of weight in typhoid fever has been attributed to (1) partial starvation, (2) the febrile temperature, and (3) the toxic destruction of protein. The infectious fevers cause a greater loss of nitrogen than starvation or artificial temperatures, so that it has been assumed that the bacterial toxins exert a destructive influence on the body cells. It has been proved by Coleman and his coworkers that it is possible in adults by the high caloric diet to prevent not only the loss of nitrogen but the loss of weight as well. The main objections to such a diet are that 1. the patients cannot digest and absorb so much food; 2. the amount of fat will cause alimentary disturbance and acidosis, and that granted absorption, patients do not require that amount of food advocated. As to the food required it has been found clinically that patients lost weight when an excess of food was

not given; although an excess of from 1000 to 2000 calories was furnished over what the patient expended there was a loss of both weight and of nitrogen unless such excess was given. In the later stages of the disease the excess is used for storing fat. From the bacteriological standpoint the studies of Arthur I. Kendall (*Boston Medical and Surgical Journal*, vol. cxviii, No. 23, p. 825, June, 1913), are very important. Small feedings frequently repeated are important in treating typhoid fever from the bacteriological point of view, so as to maintain a minimal concentration of utilizable sugar in the intestinal tract and in the body as well. Infrequent feedings fail to do this because the carbohydrate is, as a rule, rapidly absorbed from the intestinal tract, leaving a residue of proteins if the bowel movements are not frequent. The abstraction of carbohydrate forces the bacteria to utilize protein, be it body tissue or intestinal residuum. The object of the carbohydrate diet is twofold. Physiologically to provide the patient with a readily assimilable food requiring a minimal amount of digestive energy to prepare it for the tissue needs; and bacteriologically to shift bacterial metabolism from the destruction of the body tissue for their food requirements to the utilization of carbohydrate for at least the major part of their dietary needs. This did not result in the annihilation of the invading bacteria, but it certainly approaches their metabolic reformation. Aside from giving a total amount of food with sufficient caloric values there must be a certain minimum of protein in the diet. Inasmuch as no metabolic studies have been made upon children suffering from typhoid fever we know of no standard for the daily protein ration in childhood. In our series of cases no attempt was made to have either an upper or a lower limit of protein, but the general rule was adhered to, to have the protein calories not less than 7 nor more than 15 per cent. of the total number of calories given. The routine treatment was sponge baths for temperatures of 103.5° F. Patients were kept on balconies or in rooms with open windows. Typhoid vaccine was administered in seven cases for from one to six doses starting with 50,000,000 and increasing by that amount each successive dose; these caused no perceptible influence on the course of the disease. From the standpoint of the clinical pathologist both Dr. J. C. Torrey and Dr. Charles Norris, the pathologist of Bellevue Hospital, have shown that when acidophile bacteria are present in abundance it is extremely difficult to recover typhoid bacilli from the stools. High fat diet temporarily restrains the growth of acidophiles, but when the carbohydrate is resumed, the acidophiles grow rapidly again. They state that the high carbohydrate diet encourages the growth of the acidophiles; that on a protein diet, such as milk, the putrefactive type predominates. Both Dr. Torrey and Dr. Charles Norris showed that when acidophile bacteria were present in abundance it was extremely difficult to recover the typhoid bacilli from the stools. High fat diet temporarily restrains the growth of acidophiles, but when the carbohydrate is resumed, the acidophiles grow rapidly again. In general it may be said that the children were fed at three-hour intervals, beginning at 6 A. M. and con-

tinuing until 9 P. M., six feedings in twenty-four hours. The articles given were very much those prescribed for a child in health, with the exception that the only meat used was creamed chicken. In order to increase the caloric value of the liquid food, which was practically always milk, lactose, cocoa, and usually cream were added. In no case was an exclusive milk diet used; every patient took cereal in some form. Eggs and toast were offered from the beginning, and it was largely a matter of the nurse's tact and encouragement how soon a diet high in calories would be taken. At first only a part of the food offered would be taken and the patient's likes and dislikes must be respected and taken advantage of. The number of calories that were actually taken after the first few days and that seemed from a clinical standpoint to have been satisfactorily utilized, varied from 100 to 300 calories per kilogram. As regards the utilization of the food, the urine in these cases very seldom showed any more than a slight trace of indican. It was at first thought that the high range of temperature would of itself interfere with the taking of so much food; this was found to be particularly true, but unless toxic nervous symptoms were present, the fever did not prevent taking a generous diet; as the temperature fell, however, the amount of food taken was greater. The series presented comprised 48 cases. The diagnosis was established by positive Widal reaction in 44 cases and by positive blood cultures in 36 cases. In only one case was there found neither a positive Widal nor a positive blood culture. The ages were as follows: under two years, 1; from two to six years 21; from seven to twelve, 26. The length of time in the hospital averaged twenty-eight days, the extreme being thirteen to seventy-nine days. The day of the disease, as nearly as could be estimated, on which the temperature became normal was found on the average to be twenty-eight days. The extremes were fifteen and fifty-eight days. The general condition of the patients was remarkably good. The so-called typhoid state occurred in much smaller proportion of cases than under the old methods of treatment. Abdominal distention was present in only six cases and in but one of these was it severe or troublesome. Five of the patients had blood in the stools some time during the course of the disease. In only two cases were the hemorrhages severe enough to cause any apprehension. In both, blood transfusion was done by the Lindemann method and each time with signal benefit. One patient who was transfused three times and who lost the most in weight during his convalescence took the largest number of calories we have ever seen recorded, viz., 8000 in twenty-four hours. Thirteen patients were irrational in the early stages of the disease. There is not the slightest doubt but that most of the severe nervous symptoms noticed in the late stages of the disease heretofore were due to starvation and the consequent increase in toxemia. Pneumonia and bronchopneumonia complicated three cases, and in the only death that occurred it was proved at autopsy that the fatal issue was due to pneumonia. There were but three relapses and only one recrudescence or a little over 8 per cent. During the course of the fever 60 per cent. of the patients gained in

weight. This was the most remarkable fact about this series. The high caloric diet prevented the loss of weight hitherto marked throughout the course of the disease. If one considers the weights of the patients at the time of leaving the hospital it is found that 92 per cent. had gained in weight.

DISCUSSION.

DR. CHAPIN.—What was the strength of the cream you used?

DR. LA FETRA.—We used 20 per cent. cream.

DR. CHURCHILL.—In this series of cases I understand that there were five out of the forty-eight having blood in the stools. Do you think there is any connection between the hemorrhage and the high caloric diet?

DR. KERLEY.—During an attack of typhoid fever a few years ago I was given a very meager diet and felt that I was entitled to more, and since that time I have allowed my patients a more generous diet in typhoid fever as my articles show. The diet I have used was very similar to the one just advocated but I have not been allowing meat until the third week. We find less tympanites after getting away from the milk diet; an exclusive milk diet was one of the chief means of producing tympanites.

DR. MORSE.—I had typhoid fever twelve years ago and learned my lesson before Dr. Kerley did. I wish to call attention to the fact that with a liberal diet one does not have the constipated stools that one gets with a milk diet. We are feeding our cases of typhoid fever on a varied diet and try to keep the calories as high as Dr. La Fetra does. As it is difficult to give the high caloric diet during the febrile period, it seems to me we should divide the consideration of this subject of feeding in typhoid fever into two periods, the febrile and the postfebrile.

DR. LA FETRA.—In reference to the relation of diet to hemorrhage, the diet was not very high in calories at the time of the hemorrhage. When the children were very sick and had a high temperature they did not take so much food, but one could gradually work them up to the higher number of calories. In a boy with hemorrhage I urged as much food as he could take when his temperature was 103° F. Dr. Morse is right in stating that there is a difference in feeding between the two periods which we must recognize.

THE GASEOUS METABOLISM OF INFANTS.

DR. FRANCIS BENEDICT AND DR. FRITZ B. TALBOT, Boston, gave a complete historical review of all the literature on the gaseous exchange and calorimetry of infants, which was followed by a presentation of the important problems in this field. Their chief aim was to study the metabolism of normal infants under conditions approximating the ideal, the infants to be selected, first, with varying ages; second, with varying weights; and third, of both sexes. A respiration apparatus, measuring simultaneously carbon-dioxide production and oxygen consumption and provided with sensitive arrangement for registering automatically and graphically the slight-

est body movement was used to study 58 infants during approximately 1000 periods of observation. Continuous pulse records and a graphic registration of the degree of muscular repose enabled many important correlations with their respiratory studies.

A series of twelve-hour continuous pulse records, accompanied by ocular observations of the degree of repose, showed a sudden and considerable increase of the pulse rate with crying or nursing and a rapid return to the low level with cessation of crying and feeding.

A comparison of the pulse rate with the muscular activity as determined by the kymograph records of the swinging crib showed invariably a close agreement. The metabolism also increased or decreased as the pulse rate and activity increased or decreased. Distinct evidence of an increased pulse rate and metabolism independent of external activity was interpreted as being an indication of internal work and suggested the pulse rate as an indication of this internal work. There were, however, a sufficient number of well-defined instances of alterations in the pulse rate unaccompanied by changes in the muscular activity to justify the assumption that an increased pulse rate was not necessarily a result of extraneous activity.

Particular stress was laid on the comparative study of the basal metabolism of the infants, *i.e.*, the metabolism during complete muscular repose as shown by the kymograph records. Under these conditions, it was found that while, in general, the smaller the infant the smaller the total metabolism, there were a sufficient number of exceptions to prevent the formulation of a definite law. Similarly there was no striking uniformity in the metabolism per kilogram of body weight, although with "normal" children, the plotted chart gave indications of an approximately regular line. As many of the infants were under weight, the total metabolism was compared with the normal weight for the age, but no approach to uniformity or regularity was apparent.

Hoobler and Murlin had duplicated their experiments and although their observations included but two atrophic infants, it was gratifying that they reported that their findings were in full account with these.

A discussion of the supposed relationship between body surface and metabolism and a critique of the methods used for measuring body surface introduced the discussion of the values found with these infants. No relationship was found between the age of the infants and the heat produced per square meter of body surface nor could any relationship be noted between the heat production per square meter of body surface and the actual body weight, the normal weight for the age, or the expected body weight.

Evidence secured with normal and atrophic infants of different ages and weights was presented to show that the active mass of protoplasmic tissue determined the heat production. This active mass of protoplasmic tissue might be stimulated to a greater or less cellular activity, the intensity of the stimulus being indicated by the pulse rate.

(To be continued.)

BRIEF OF CURRENT LITERATURE

DISEASES OF CHILDREN.

Suggestive Treatment in Diseases of Childhood.—W. W. Howell, (*Bost. Med. and Surg. Jour.*, 1914, clxx, 230) discusses the value of suggestive treatment in childhood. At what age results may be expected is an open question. In very early infancy there is some response to suggestion. A baby of six weeks may be trained to have a daily movement on a bed pan. A young baby taken from the breast may refuse the bottle. After a few tube feedings he will take the bottle perfectly. There may be some doubt about these cases but in both examples they have received an impression of some kind with a perfectly definite result. After three years, suggestive treatment is perfectly possible in most cases.

Pylorospasm and Allied Spasms in Infants.—The study of A. F. Hess (*Amer. Jour. Dis. Child.*, 1914, vii, 184) is based on a considerable number of cases in which an obstruction was found to the passage of the duodenal catheter. Cases of *congenital pharyngospasm, cardiospasm and pylorospasm* were encountered. These conditions were found at birth, even before any food had been given, or secondary to some slight alimentary disturbance occurring in the course of the first few days of life. In some cases the spasm remained latent, but in others spastic symptoms were manifested in later infancy, such as projectile vomiting and obstruction at the pylorus. Not only was pyloric spasticity encountered at birth, but, on the other hand, *pyloric insufficiency*, especially in cases of pronounced icterus neonatorum, where there is hypercholia; in these cases the bile welled past the pylorus into the stomach, and the catheter met with no resistance in its passage into the duodenum. An interrelationship was found between pharyngospasm and pylorospasm. In some cases, pharyngospasm led to vomiting immediately after feeding, and in this way prevented milk from entering the stomach. This same close relationship was found also as regards cardiospasm; and in the same way this disturbance at times prevented the entrance of food into the stomach, resulting in what may be termed "*cardiospastic vomiting*." Cardiospasm is far more frequent in infants than is generally recognized. In mild cases, cardiospasm is able to obstruct fluid poured through the catheter, or to prevent the aspiration of fluid from the stomach. Cases were encountered in which the gastric hypersecretion seemed to be the cause of this spasm of the cardia; however, in others, there was no increase of hydrochloric acid, so that it cannot be considered an essential etiological factor. Visible peristalsis and peristaltic tumor (pseudotumor) not only are

not significant of organic obstruction, but even a spastic obstruction is not necessary for their production. Numerous cases were encountered with pronounced hyperkinesis of this description, where the catheter met with no obstruction at the pylorus. This is especially true of cases of alimentary intoxication. As these signs may be absent where numerous tests convincingly demonstrate pylorospasm, we must conclude that there is no essential interrelation between obstruction at the pylorus and hyperkinesis. It was possible to produce peristalsis artificially in the new-born by instilling 2 c.c. of 0.4 per cent. hydrochloric acid into the stomach, and in older infants to induce distention or marked ballooning of the stomach by this means. The presence of the catheter did not lead to peristalsis, even where this sign could be brought to view by putting a small amount of liquid into the gastric cavity. A palpable tumor was not encountered in any case in which the catheter could traverse the pylorus; nor did the presence of the catheter within the duodenum render the pylorus palpable. Gastric hypersecretion is not the cause of these marked cases of pylorospasm. Cases were tested in which these two conditions were found associated, but also in which spasm existed without the accompaniment of gastric hypersecretion. Although the introduction of a small amount of hydrochloric acid into the stomach of the new-born was not sufficient to produce spasm of the pylorus, it led to marked reflex symptoms, *e.g.*, gagging (pharyngospasm), hiccough, pain, increased rapidity of respiration. In some cases of pylorospasm, those accompanied by gastric hypersecretion, duodenal hypersecretion or succorria was also encountered. Singultus is a frequent symptom of pyloric obstruction. It may be incited in new-born infants not only by allowing a small quantity of hydrochloric acid to enter the stomach, but by the passage of the catheter through the pylorus; the latter may also lead to pyloric cough. Pylorospasm should be subdivided into two groups, the *primary* cases, those which occur in breast-fed infants without apparent exciting cause (the classical instances), and *secondary pylorospasm*, occurring as a complication of some other disturbance, generally alimentary in nature. The former are the more severe. However, the peristaltic waves and tumors may be equally marked in either. Mild pylorospasm, cardiospasm and pharyngospasm were at times encountered in tetany and other nervous disturbances, indicating a spasmophilia of the alimentary tract. Moderate spasm of the pylorus may exist, as proved by catheterization, and nevertheless evince no symptoms (latent pylorospasm), as the symptoms depend in a large measure on the frequency of relaxation of the spasm; that is to say, on its degree of tonicity or clonicity. There is no sharp dividing line between the normal and the spastic pylorus: tonicity, hypertonicity, spasticity, are merely positive, comparative and superlative terms. In addition to pharyngospasm and cardiospasm, other visceral spasms were found associated with pylorospasm, *e.g.*, laryngospasm and anospasm, the latter leading to anal fissures and prolapse. Pylorospasm was found rarely as an isolated spastic symptom.

Treatment of Gonococcus Vulvovaginitis.—In contrast to the pessimistic reports of some observers, G. G. Smith (*Amer. Jour. Dis. Child.*, 1914, vii, 230) records his results in sixteen cases reported a year ago and seen recently. It seems that 50 per cent. of these cases the evidence of cure would satisfy the most skeptical. Of the remaining 50 per cent. no one seems to be still definitely gonorrheal, though three of them may be such though the organism cannot be found. Two cases are ruled out because of a moderately positive blood test, although in every other way one of them appears to be a cure. In an acute case, confinement to bed, regulation of the bowels, much water, a light diet and the frequent bathing of the external genitals with warm boric solution are the measures to be employed. After the acute condition subsides, the child is placed on her back on the table, her hips elevated by a douche-pan. The labia are separated and a female soft rubber catheter, size 12 or 14 French, well lubricated, is passed through the opening in the hymen as far as it will go. A fountain syringe is hung about 2 feet above the patient. The tube should be tipped with the glass part of a medicine dropper, which fits securely into the funnel end of the catheter. The solution selected for this douche, is allowed to run. From 1 to 2 quarts, heated to about 110 in the reservoir, should be used. After this solution has run into the vagina and out again around the catheter, the catheter and glass tip are separated, and through the catheter, which has been held in place all this time, 1 or 2 drams of one of the silver salts is injected with a hand syringe. The catheter is then withdrawn, the child holds her thighs close together to prevent the escape of the silver preparation and lies in this position, hips elevated, for at least fifteen minutes. This treatment should be given twice a day, but even if used only once daily, is very effective in checking the discharge. The solutions used for the douche are sterile water, boric acid solution 2 per cent., sodium bicarbonate a teaspoonful to a quart, or potassium permanganate 1-8000 or 1-6000. The purpose of the douche is the removal of mucus preliminary to the application of silver, and the increase of circulation locally through heat. In the more acute stages the blandest solutions are the best, sodium bicarbonate being especially soothing. Later potassium permanganate with its slight astringent action is good, and in the chronic stages, silver nitrate as strong as 1-1000 may be used. In choosing a silver salt, one should start with the least irritating preparation. Argyrol 10 per cent. is well borne in the more acute cases; later it can be increased to 20 per cent. or the somewhat more irritant protargol can be used (not stronger than 5 per cent.). Urethritis is treated by the instillation of 1 or 2 c.c. of 5 per cent. argyrol into the urethra by means of a medicine dropper. The treatment should be carried on for at least a month after all symptoms have disappeared. One must remember, however, that occasionally a discharge may be kept up by too persistent treatment.

Perforation of the Intestine by Ascarides.—Hermann Plew (*Arch. f. Kinderheilk.*, Bd. lxii, H. 1 and 2) speaks of the possible wandering

of ascarides into the gall-bladder and liver, of inflammation of the pancreas from the same cause, and of obstruction of the intestine by masses of these worms. There is a question whether it is possible for the worms to perforate the sound intestine, or whether there must be a previous lesion of the mucosa before the worm can attack the walls. Ulceration is frequently seen in connection with worms at autopsy. The author goes over the history of cases of this kind published in literature. Three different conditions may be present in such cases: the first supposes active condition of the worms which perforate by biting the wall; a second supposes that there is a pathological condition of the intestinal wall before the worms attack it, a *locus minoris resistentiæ* in the wall, caused by the poisons produced by the worms. In the third there is no pathological condition of the mucosa. *A priori* no perforation of the sound intestine by ascarides is possible. The intestine may be affected by poisons from the excreta of the worms, and the dead bodies of worms as well as specific toxins produced by them, leucomaines, ptomaines, and alkaloids. In the bodies of the worms are found fatty acids, ethers and alkaloids which may cause hyperemia, inflammation and necrosis. The symptoms are abdominal pain, nausea, vomiting of masses of fecal matter, and loss of appetite. Nervous symptoms are mydriasis, strabismus, blindness, deafness, aphonia, delirium, hallucinations, hysteria, chorea, convulsions, etc. Chronic poisoning results in anaphylaxis. The author concludes that perforation of the intestines by ascarides may be caused without any previous lesion of the intestine. A typical case is described in which a diagnosis of abdominal typhoid was made. At autopsy the lumbricoids were found in the left hypochondrium. The ulcerations produced in the intestine could not be differentiated from those of typhoid.

Etiology of Recurrent Intussusception.—H. T. Gray (*Lancet*, Mar. 14, 1914) thinks it reasonable to suppose that acute general infections, which may cause effusions in the skin and subcutaneous tissues and in other regions, may also be responsible for effusions into the intestinal wall. Such an effusion, by preventing the proper contraction of the intestinal muscle in its vicinity, creates an inert area in the bowel wall. Such an inert area constitutes, as it were, a "foreign body" in the intestinal wall; and this affected piece of bowel tends to be driven along the canal (with the intestinal contents) in the same manner as an intestinal polyp or inflamed Peyer's patches. The result is that during peristalsis the mesentery is dragged on by the efforts to drive along this portion of bowel and typical colicky pain results. The effort made by the muscular action of the intestine to drive along the canal such inert areas will when anatomical conditions are propitious, actually invaginate the bowel wall at such a situation and intussusception results.‡

When intussusception starts high up in the ileum the possibility of a persistent Meckel's diverticulum, or a solitary intestinal polyp (arising from the invagination of a diverticulum), should be borne in mind and looked for as an exciting cause. When these are absent, or when the intussusception starts in the cecum, the

blame may often be laid at the door of an acute general infection, and the source of such an infection should be carefully sought and treated when the child has recovered.

Tongue-chewing.—In reporting four cases of tongue-chewing, B. Myers (*Brit. Jour. Child. Dis.*, 1914, xi, III) says that this condition is first noticed about the second year of life and persists until middle age, or, perhaps, throughout life. It tends to be less noticeable with advancing years. Either sex may suffer from it. It occurs, apparently, in healthy families, in which certain members suffer from habit-spasms. Several members of one family may suffer from it. The habit is inherited, as far as one can see, and not copied. The same side of the tongue is always chewed in the same individual. The mental condition is quite normal and the general health is not interfered with in any way. Bromides stop the tongue-chewing, but in time, after leaving off the drug, the habit recommences.

Operation for Hip Contractures in Poliomyelitis.—Contractures of the soft tissues at the hip due to the shortening or lack of growth of the soft tissues following paralysis or injuries are sometimes easily overcome by manipulation and stretching. When they are of long standing they may not yield to tenotomies of the tendons and of the tensor fascia femoris, and myotomies are necessary. For difficult cases and some of the milder ones the following operation has been devised by R. Soutter (*Bost. Med. and Surg. Jour.*, 1914, clxx, 380): First, a longitudinal incision is made 3 inches long, parallel with the long axis of the body, with its middle 2 inches posterior to the anterior superior spine. It is carried down to the fascia. By retracting the subcutaneous tissue the fascia is exposed from the anterior superior spine back to the trochanter. Second, the fascia is incised at right angles to the skin incision, cutting all its fibers transversely from the anterior superior spine back to the great trochanter. Third, the skin incision is next retracted as to expose the anterior superior spine. By means of an osteotome, the attached muscles and fascia are removed from the anterior superior spine subperiosteally on the inside, on the outside and below; they are all pushed downward. The hip is hyperextended backward, pulling the tissues down with it. If the tension is great the soft tissues are pushed down by means of gauze or blunt dissector, clearing off the periosteum and soft tissues from that part of the pelvis below the anterior superior spine. Following the operation a plaster-of-Paris bandage is applied to the whole leg. The hip is hyperextended in order to correct the lumbar lordosis usually present in these cases. It is also adducted slightly to stretch the lateral contractures. The plaster of Paris extends from the nipple line in front and from the lower waist behind to the toes of the foot operated upon. The patient is put on a Bradford frame elevated to allow the legs to drop to a lower level than the hips and shoulders. By this method of procedure the muscles are not cut across; their periosteal attachment is simply moved $1\frac{1}{2}$ or 2 inches downward.

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ORIGINAL COMMUNICATIONS

**EXPERIMENTAL LIGATION OF ONE URETER, WITH
 APPLICATION OF RESULTS TO CLINICAL
 GYNECOLOGY.¹**

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 (With twenty-six illustrations.)

THIS problem is not a new one; and although considerable data, both experimental and clinical, have accumulated during the last few years, yet the question as to what results follow the obstruction of one ureter has not been satisfactorily answered in many important particulars. In an extensive search of text-books and periodical literature, the writer has been unable to find a reasonable unanimity of opinion. Hence, he was led to make his own contribution toward a solution of the problem experimentally, and also has collected considerable evidence from the clinical field. In the human subject, the ureter is most frequently wounded or ligated either intentionally or accidentally during operations upon the female intrapelvic genital organs. "Out of over 100 cases of operative injuries to the ureter, recorded in surgical literature, it has been impossible to find one in the male sex" (Markoe and Wood). The writer's experience is precisely similar. It is, therefore, evident that this subject belongs in the domain of gynecology.

The writer has ligated the ureter in fifty-two dogs; and the results of this work together with observations upon a personal clinical case of probable ureteral obstruction by accident, constitute the basis of this paper. After advancing well into the problem, it was found

¹ Inaugural thesis, presented to the Chicago Gynecological Society and read before this organization, April 17, 1914.

to be much larger than had been anticipated originally; but I have gone far enough now to have arrived at some definite conclusions. However, there is so very much more work to be done that this thesis is presented, not as a final report but rather as a preliminary statement.

A. REVIEW OF THE LITERATURE ON EXPERIMENTAL COMPLETE OBSTRUCTION OF THE URETER.

A very considerable amount of work has been done in this field; but no one has taken the trouble to get together these exceedingly varying and widely scattered reports and to obtain from them possible conclusions. The different authors almost invariably content themselves with a mere enumeration by name, either miscellaneous or chronologically, of a few writers supplemented in each instance merely with a few general remarks.

In the following description, I have attempted not only to gather all of the essential facts from each writer but also especially to group them so as to discover what each investigator has contributed to the various phases of this subject. In order to handle efficiently any single feature in this field, one must be familiar with the subject as a whole. Therefore, I have made a thorough canvass of the literature dealing with ureteral obstruction, especially of the complete type, and have set forth, largely in tables, the results of my collaborations; and on this work of my predecessors as a basis, I have placed my own researches. The results of various workers are exceedingly contradictory in so many respects that the writer agrees with the opinion of Tuffier that "hydronephrosis is of all the surgical affections of the kidney by far the most debated and the most debatable."

HYDRONEPHROSIS vs. ATROPHY.

Operative Technic.—This is not explained in detail by most investigators and in some instances no description is given. All of the animals doubtless after being shaved were scrubbed with soap and water. Barney, Scott and perhaps others followed this with an application of iodine. None of them seems to have been exceedingly careful in regard to asepsis, not as painstaking as he would have been with a human case. This point is important, because the application clinically of experimental results in regard to infection are not of great value unless every point of asepsis in the experiments is observed with the utmost care.

In one of his animals, Barney reopened the abdomen at the eighth, the tenth, and the eighteenth week for the purpose of studying the development of the lesion. This method of following more closely the living pathology seems to be of considerable value. This same investigator in some of his animals also withdrew the hydro-nephrotic fluid, and thus found that it was replaced fairly rapidly; this, he says, can be repeated "again and again."

Reference to Table I, will show further in regard to technic that the kind of ligature material is of no significance except as one kind may maintain occlusion of the ureteral lumen more efficiently than another. Those who have stated the kind of material selected, have mentioned in nearly every instance a nonabsorbable substance, usually silk or linen. Barney used chromicized catgut in some of his experiments. Beer maintains that for the purpose of producing complete obstruction, catgut (presumably plain) is as effectual as silk.

The number of ligatures used, division of the ureter or excision of a portion of it between them, knotting of the ureter supplemented by a ligature above or below (Kawasoye) are all points of importance only as they succeed or fail in producing completeness of obstruction. Fraenkel, Robinson and many others have been troubled with the formation of ureteral fistulæ, an occurrence frequently observed also in the human. Hildebrand and Haga, and Tuffier produced obstruction in many of their dogs by angulation. With this method, of course, there is some doubt as to the completeness of the closure. Nevertheless, I included them in my tabulations because there seems to be no reasonable doubt that the occlusion was practically absolute.

Of the five who stated what route they used, only one (Scott) employed the extraperitoneal. This I believe is preferable for all ligations above the pelvic brim, for the same reasons that it is the method of choice in the human patient for operations of the upper urinary tract. For work nearer the bladder, it seems to be impracticable, in dogs at least, to keep outside the peritoneal cavity.

Before proceeding further the word atrophy needs to be defined. It is used by various writers in two distinct senses: first, the thinning of the medulla and later of the cortex which occurs in every hydronephrosis; second, decrease in the size of the kidney as a whole. The first is best called hydronephrotic atrophy; the second may occur with or without hydronephrosis. (See Figs. 9B to 15B.) This latter is the atrophy referred to in this article unless otherwise specified. Although thinning of the cortex and the medulla occurs

in practically every case of hydronephrosis, yet there is no constancy in regard to the enlargement of the kidney as a whole. In some cases, the entire kidney may be converted into a very thin-walled cyst which equals or is less than the volume of a normal kidney. Again, the cystic formation may be enormous in size, while between these extremes all gradations occur. The word hydronephrosis is often employed to designate a dilated kidney regardless of the nature of its contents.

The possible known factors which may determine whether hydronephrosis or atrophy shall follow a complete permanent ureteral obstruction are as follows:

1. Kind and age of animal.
2. Height or level of obstruction.
3. Duration of etiological factors, especially obstruction.
4. Infection, including virulence.
5. Capsular anastomosis.

The most important of these seem to be the third and the fourth. In Table I are collected the results of a large group of experimenters who have investigated the above points. A study of this collaboration leads to the following considerations.

1. *The Kind of Animal.*—Those used mostly were dogs (188+); next in frequency were rabbits (47+), guinea-pigs (20+), hens (4), rats (3), and cats (one investigator, number of animals not stated). The only evidence I have found that the kind of animal has any influence in determining the production of hydronephrosis or atrophy is the remark of Barney that he prefers dogs to rabbits because in the former the results are more striking. Also, the observation of Henderson that ureteral contractions disappear in dogs within an intraureteral pressure of 26 to 32 mm. Hg. and in rabbits at 8 to 16 mm. Hg., would tend to demonstrate, perhaps, an essential difference in the reaction of these two kinds of animals to ureteral obstruction. On the other hand, the difference may be due merely to the considerable disparity in size between these two varieties of animals.

It has occurred to me while carrying on my own experiments, that the age of the animal might influence somewhat the formation of renal atrophy or hydronephrosis. This point will be referred to later, as nothing concerning it was found in the literature. Senator says that "compensatory hypertrophy does not often develop after the active period of growth, the heart becoming hypertrophied instead." If this is true, it seems reasonable to assume, as a working

hypothesis at least, that age may have some influence also in determining the formation of hydronephrosis or atrophy.

2. *The Height of the Ligature.*—It has seemed to the writer that this might determine in part at least the production of general atrophy. The theory has been advanced by J. Bell that “the higher the obstruction the greater the probability of hydronephrosis.” To substantiate this view, he cites a clinical case of marked hydronephrosis due apparently to a ureteral injury near the renal pelvis. Bell is the only writer consulted who holds this opinion; and since, furthermore, his evidence seems to be very meager, the conclusion is inevitable that this theory is not established.

3 and 4. *Duration of Obstruction and Infection.*—The gist of the whole subject of the occurrence of hydronephrosis and general atrophy of the kidney by complete ureteral closure lies in these two factors. They are so intimately associated with each other that it seems best to discuss them together. Other causes besides these may have more or less value; but according to the preponderance of evidence at present, *time and infection* are the all-important ones.

There is almost complete unanimity of opinion among investigators that atrophy of the kidney as a whole almost never occurs during the first few weeks after complete ureteral occlusion. It is usually not apparent for several months. Beer and Rautenberg are the only investigators consulted who find general atrophy earlier than the end of the second month. Therefore, I have selected the sixtieth day after the production of the obstruction as approximately the time before which one cannot reasonably expect to find a diminution in the size of the whole kidney.

The occurrence of a primary hydronephrosis with more or less increase in the volume of the kidney during the first few weeks following complete closure of the ureter is one of the comparatively few points concerning which there is practically complete unanimity of opinion. So I have put in a group by themselves (Table II) all the animals in which the findings after sixty days were definitely stated, and have noted in connection with each animal any information given by the writers concerning infection. Of ten of the hydronephroses recorded in Table II, four were infected positively and six, possibly, according to the statements of the experimenters. Also, there is no positive evidence that there was not at least a mild infection in the other seventeen; clear fluid contents, for example, does not necessarily mean that there is not even a slight infection—enough, perhaps, to determine the development of a

TABLE I.—HYDRONEPHROSIS VS. ATROPHY.

Experimenter	Animals and number	Ligatures		Miscellaneous	Hydronephrosis		Atrophy		Infection	Remarks
		Material	Location		No.	Kidney and ureter	Time	Kidney and ureter			Time
Amos.....	Guinea-pigs and rabbits.	Silk.	Rather low.	2	Complete division between ligatures.	Always present. Ureter dilated.	.....	.....	2 guinea-pigs and 1 rabbit.	Death attributed to reabsorption of secreted urine.
Bainbridge...	Cats. No. not stated.	.....	Close to the bladder.	2	Portion between ligatures excised.	"Invariably present."	2 days to 7 weeks.	.....	"Invariably first intention" in abdominal wounds. Hydronephrotic fluid, usually turbid; leucocytes and blood-stained debris were present.	Insufficient details.
Barney.....	26 dogs, 7 rabbits.	Silk or chromicized cat-gut.	At "pelvic brim."	2	Complete division between ligatures. Intra-peritoneal route.	All but 1.	2 to 258 days.	1 only.	3 died of "sepsis." In dogs, abdominal wounds all septic except one. Peritoneum clean.	Barney believes hydronephrosis depends on capsular anastomosis.

TABLE I.—HYDRONEPHROSIS VS. ATROPHY.—(Continued.)

Experimenter	Animals and number	Ligatures			Miscellaneous	Hydronephrosis		Atrophy		Infection	Remarks
		Material	Location	No.		Kidney and ureter	Time	Kidney and ureter	Time		
Beer.....	60 dogs.	Silk or catgut.			Results with silk or catgut, same.	Primary, always. Infection = continued dilatation.	Up to 3 weeks.	Always, if no infection.	After 3 weeks. Marked at 3 months.	None unless produced artificially.	After 11 to 40 days, external ureteral fistula produced and followed by marked atrophy of kidney as a whole. Same results with catgut or silk. No hydro-nephrosis without infection.
Bradford.....	12 dogs.	Silk.	Close to bladder as possible.	2	Complete division between ligatures.	All cases. Pelvic capacity = 40-70 c.c. Ureter remains dilated after atrophy following restoration of ureteral lumen.	11 to 40 days.			3 animals.	
Albarran.....		Silk.				Rule, at first		All, "ultimately."			

TABLE I.—HYDRONEPHROSIS VS. ATROPHY.—(Continued.)

Experimenter	Animals and number	Ligatures		Miscellaneous	Hydronephrosis		Atrophy		Infection	Remarks
		Material	Location		No.	Kidney and ureter	Time	Kidney and ureter			Time
Charcot and Gombault.	Guinea-pigs.				Apparently in all.	5, 13, and 21 days.			Hydronephrotic fluid, clear.	Only few details given.
Corbett.....	24 rabbits.	Linen.	Probably close to kidney.	I	Small.	1 day.	Hydronephrosis may be followed by secondary atrophy."			All kinds of complete obstruction give similar results.
Fraenkel.....	11 rabbits.			I	Intraperitoneal route.	6 days.				
				2	In 9 rabbits.	26 days				
					All (?).	2 to 92 days.	None described.		About 50 per cent. infected. One died from peritonitis on the 21st day.	Experiments done primarily to investigate formation of ureteral fistula following ligation.
Frank and Baldauf.	Dogs.....	Pagenstecher's yarn.	A few, high; most, close to bladder.	1	Intraperitoneal route. Ureter ligated <i>in situ</i> .	2 hours to 2 months.	80-90 per cent. without gross changes.	2 hours to 2 months.	Rather common; staphylococci. 6. renal abscess. 1. metastatic infection in femur.	

TABLE I.—HYDRONEPHROSIS VS. ATROPHY.—(Continued.)

Experimenter	Animals and number	Ligatures		Miscellaneous	Hydronephrosis		Atrophy		Infection	Remarks	
		Material	Location		No.	Kidney and ureter	Time	Kidney and ureter			Time
Hildebrand and Haga.	8 dogs.	.....	About midway between kidney and bladder.	.....	In 2, obstruction by ligature; in 6, by angulation.	Kidney and ureter	5 marked.	Kidney and ureter	2 marked.	Probably none or slight.	
							1 slight.		6 days to 5 months.				166 days and 11 months.
Kawasoye...	24 dogs.	Silk.	Apparently close to the kidney.	1	In some animals, tied knot in ureter supplemented by a ligature.	Kidney and ureter	In every animal.	Kidney and ureter	.....	Fluid in kidneys turbid, frequently brownish and containing many leucocytes and erythrocytes.	
							4 hours to 70 day		.....	
Likhatschef..	4 hens.	.....	.....	.....	.....	Kidney and ureter	2 hens died in 28 hours. Kidneys red and congested. No definite statement concerning hydronephrosis.	Kidney and ureter	I, ureter thickened and size of goose-quill.	9 days.	
							.....		I, "1/3 normal size."		
Lindemann ..	10 dogs.	.....	.....	.....	.....	Kidney and ureter	7, ureter dilated and usually hypertrophied in both nephrotic and atrophic kidneys.	Kidney and ureter	I, 1/3 size other kidney.	63 days.	Probably none or very slight.
							8 days to 88 days.		I, 1/5 normal size.		
								I, marked.			286 days.	302 days.

Believes that hydronephrosis depends on capsular anastomosis.

TABLE I.—HYDRONEPHROSIS VS. ATROPHY.—(Continued.)

Experimenter	Animals and number	Ligatures			Miscellaneous	Hydronephrosis		Atrophy		Infection	Remarks
		Material	Location	No.		Kidney and ureter	Time	Kidney and ureter	Time		
Pearce.....	5 rabbits.	.....	'2 cm. from ureter's origin.'	.....	.....	Kidney and ureter	10 days to 88 days.	.....	.....	I pyonephrosis.	
		'1 cm. from ureter's origin.'	3.	32 days to 44 days.	.....	.....			None or slight.
Robinson....	3 dogs.	Linen.	.....	.....	Abdominal route.	Kidney and ureter	26 hours.	1, 1/5 original size.	6 months.	.....	These ligations were done in connection with experimental enterorrhaphies.
		.....	.....	.....	.....	I, fluid under very high tension.	6 weeks.	.....	.....	.....	.....
Rosow.....	8 dogs.	.....	.....	.....	.....	Kidney and ureter	1 day to 263 days.	.....	.....	Probably slight in some cases.	These experiments done primarily to determine intra-ureteral pressure.
		.....	.....	.....	.....	All, slight enlargement to 4 times size other kidney. Ureter dilated.	.....	.....	.....	.....	.....
Scott.....	30 dogs.	Silk-worm-gut.	About midway between kidney and bladder in most dogs.	2	Extraperitoneal route. Ureter not cut between ligatures.	Kidney and ureter	5 days to 108 days.	I, in which ureteral obstruction was complete.	22 days.	None described.	Holds that capsular anastomosis is not a causative factor in formation of hydro-nephrosis.

TABLE I.—HYDRONEPHROSIS VS. ATROPHY.—(Concluded.)

Experimenter	Animals and number	Ligatures		Miscellaneous	Hydronephrosis		Atrophy		Infection	Remarks
		Material	Location		No.	Kidney and ureter	Time	Kidney and ureter			Time
Sollman, Williams and Briggs.	4 dogs.	.....	5 cm. from kidney.	.....	3, marked.	31, 77, and 166 days.	1, about 1/5 size other kidney. Dense texture.	185 days.	1 at least of the hydronephrotic kidneys infected.	The atrophied kidney was found 78 days after formation of fistula artificially.
Straus.....	20 guinea-pigs.	.....	.....	.....	Apparently in all.	4 months to 5 months.	.....	.....	5 died of peritonitis.	
Rautenberg..	2 dogs.	.....	.....	.....	.....	.....	1 = 1/5 size other kidney. 1 = 1/4 size other kidney.	34 days.	Apparently none.	16 other dogs in this series, but details not given so as to make possible inclusion in this table.
Tuffiet.....	3 dogs.	One, silk.	.....	2 obstructed by angulation.	All 3 marked.	29 to 33 days.				

For summary of this table, see descriptive text and Table II.

hydronephrosis. It is thus very probable that a large proportion and possibly all of these hydronephroses had a mild infection as at least one causative factor, if not the chief one.

The virulence of the infection is doubtless an important feature. According to Beer, complete ureteral obstruction plus no infection equals hydronephrosis; obstruction plus virulent infection equals pyonephrosis (including general renal enlargement). As will be shown later, my own experiments tend to confirm this view. As has been shown by Rosenow* in the experimental production of gastric ulcer that bacteria of neither too great nor too low virulence are necessary, so it is conceivable that infection of a certain grade tends particularly toward the production of general renal atrophy. Furthermore, it should be stated in this connection that Beer has demonstrated also that mere injection of colon bacilli into the ureter without producing any stenosis whatever will cause the development of a well-marked hydronephrosis *without any gross signs of infection*, such as pus in the renal pelvis, abscess formation, etc. Johnson also agrees with Beer in this regard. This fact doubtless explains the clinical cases of idiopathic hydronephrosis described by Bland-Sutton and others in which they found no apparent cause whatever to account for the lesion. These observations in regard to the results of mild infections should be noted particularly in connection with the work of Scott and others, who seem to consider that because a hydronephrotic fluid is clear, it is therefore not infected. This surely is an unwarranted assumption. Straus and Germont found on the fifteenth day in one of their animals that a nonpurulent clear hydronephrotic fluid contained many micrococci. Nothing but microscopical and cultural tests will ever determine the sterility of any fluid; and even then, negative results may be misleading. In this very important detail, the work of nearly every investigator in this field is deficient. Frank and Baldauf, and Barney seem to be the only ones who made any cultures.

The element of time is absolutely essential for the production of either a high degree of hydronephrosis or a general atrophy of the kidney; yet there are many writers who do not recognize this well-grounded fact. For example, Lindemann is quoted by various authors as having had three cases of atrophy in six dogs, no note being made of the fact that two of the animals were allowed to live only forty-one and fifty-two days respectively, intervals which were too brief for diffuse atrophy to develop. Hence, the correct state-

* Rosenow, E. C. The Production of Ulcer of the Stomach by Injection of Streptococci, *Jour. Am. Med. Assn.*, 1913, lxi, 1947-1950.

TABLE II.—HYDRONEPHROSIS VS. ATROPHY, SIXTY DAYS AFTER URETERAL OBSTRUCTION AND IN RELATION TO INFECTION.

Investigator	Hydronephrosis	Atrophy	Infection
Barney	3	1	Eighty per cent. of all of his animals had infected abdominal wounds; three died of infection. In five animals, hydronephrotic fluid, sterile. No details concerning the three of this table.
Hildebrand and Haga. . .	5	3	No statement.
Kawasoye	2	.....	In these two dogs, fluid in kidneys turbid, brownish and contained many erythrocytes, leucocytes, and desquamated epithelial cells.
Likatscheff .....	.....	2	No statement.
Lindemann	2	3	No statement.
Pearce	1	.....	No purulent inflammation in this one.
Robinson .....	.....	1	No statement.
Rosow	2	.....	One of these, at least, contained yellowish-red fluid.
Scott	9	.....	Renal fluid clear in every case. Infection, if any, very mild.
Sollman, Williams and Briggs.	2	.....	One contained purulent fluid.
Fraenkel	1	.....	Implication of about 50 per cent. infection.
Tait .....	.....	1	No statement.
Merklen .....	.....	1	No statement.
Partial totals	27 = 69 per cent.	12 = 31 per cent.	
Frank and Baldauf.	15 per cent.*	85 per cent.*	"Infection of kidney not infrequent." Six had abscesses in kidney. No further details.
Beer	10 per cent.*	90 per cent.*	Infection = hydronephrosis. Sterility = atrophy after three weeks. No further details.
Final averages.	31 per cent.*	69 per cent.*	

* Results stated in percentages only.

ment in regard to these six animals is that atrophy developed in three out of four which were kept long enough for this lesion to appear, making the percentage seventy-five instead of fifty. A secondary atrophy might have occurred in the two animals killed earliest had they been allowed to live 286 or 302 days, the periods in two of the dogs which were kept the longest.

It appears that the two chief reasons why general renal atrophy seems to be infrequent are: (1) but few investigators allow their animals to live long enough for this lesion to supervene, and (2) more or less infection creeps in. It has been suggested by Fabian that the secondary atrophy following primary hydronephrosis is in some cases superceded by a recurrence of hydronephrosis. The grounds for this view are not stated.

5. *Capsular Anastomosis*.—Senator, Lindemann, and Barney have advanced the theory that hydronephrosis depends upon capsular anastomosis for its development. Barney particularly is very emphatic in his statement on this point, claiming that atrophy follows invariably whenever this anastomosis is not established. Scott, however, has produced hydronephrosis in a kidney surrounded by a sac so that no anastomosis could occur. He seems to consider that by this means he has excluded this alleged etiological feature. Even though it may be one factor, there is great doubt whether it merits the exclusive rôle assigned it by its supporters. Much more work must be done along this line before this theory can be considered as either established or disproved.

Clinical Cases.—These throw some light on hydronephrosis and renal atrophy, although the various factors are not under such control as in experiments on animals. West describes a patient in which low ureteral obstruction due to omental adhesions produced marked atrophy of the left kidney. Allen and Parker relate a case of congenital obstruction of the left ureter in which the left kidney was atrophied and the right one hypertrophied. In a series of fifty-six collected cases of congenital ureteral occlusion, Bottomley found four instances of atrophy, the rest showing more or less hydronephrosis. Brown, J. V. Bell, and Dowd, among others, have described renal lesions due to ureteral obstruction by calculi. Brown's case was bilateral and the left kidney was "less than natural," while the right one was of "monstrous size." In Bell's case also, both ureters were blocked, and both kidneys were twice normal size. Dowd's patient exhibited an immense hydronephrosis on the left side, which had produced mechanical symptoms only. The right kidney presumably was comparatively normal. J. Bell

gives the history of a case of traumatic obstruction of the ureter which resulted in a large hydronephrosis in twenty-four hours. So rapid a development of this lesion seems incredible in the light of other clinical cases and especially of experimental work.

These few instances are cited from among many in human pathology, to draw attention to the fact that although hydronephrosis is more common as a result of ureteral obstruction, yet atrophy is not altogether infrequent. In some of these patients, it is not certain that the obstruction was complete. In fact, most cases in the human are intermittent; sometimes they are partial and continuous; and least frequently of all is the closure complete and permanent. Hence, most of them are not pertinent in this paper where we presuppose that the occlusion is complete. Also, it is very difficult to draw definite conclusions from human cases because the causative agents are not under control.

Complete vs. Incomplete Ureteral Obstruction.—In the discussion hitherto, it has been assumed in practically every instance that the closure was complete. As to what results follow complete as compared with incomplete occlusion, there is the widest divergence of opinion, and that too on experimental evidence. One side claims that when the obstruction is complete the essential result is atrophy, hydronephrosis being a slight or at most a transitory sequel. The other camp defends the claim that hydronephrosis is the nearly constant result, atrophy either primary or secondary being exceedingly rare. This point in regard to the degree of obstruction is complicated in nearly every experiment with so many other factors that it is extremely difficult to arrive at reliable conclusions. It has not been demonstrated conclusively by any one that either hydronephrosis or atrophy is a constant result of uncomplicated ureteral obstruction, either complete or partial. However, it does seem to be fairly well settled that atrophy is much more likely to follow complete than incomplete obstruction and that this atrophy usually is not primary but is secondary to primary hydronephrosis. The only instance the writer has found in which atrophy has followed incomplete obstruction is in one of Scott's dogs. A high degree of hydronephrosis frequently follows either partial or absolute closure but appears to develop more rapidly after the latter. Scott has shown this rather conclusively. Although dilatation occurs more slowly after incomplete obstruction yet the possibilities of attainment of immense size, if time enough is allowed, seem to be greater than when the occlusion is complete.

Comparing ureteral occlusion with obstruction of the pancreatic

and the salivary ducts, Lawson,* Marks,* and Pratt† “found that a rapid sclerosis and atrophy of the pancreas were produced. . . after all the ducts had been tied.” In like manner, Tait has shown experimentally that “atrophic sclerosis of the parotid gland follows obstruction of Steno’s duct. Its extent is in direct proportion to the degree and duration of the obstruction.” In order to be in harmony with these two groups of findings, we should expect to find similar results in the case of the kidney and its ureter. It is very evident that our knowledge concerning the results of various degrees of ureteral obstruction is in a very confused condition. And nothing will put things in order except researches from which complications are excluded with certainty.

Microscopical Changes.—Concerning the character of these, there is practically complete unanimity of opinion among investigators. In the formation of hydronephrosis there is described as the initial stage a condition of hyperemia with edema, which gradually disappears during the first few days. The second stage, according to Barney and others, consists in tubule dilatation. This begins rather early, overlapping considerably the early congestion. The straight tubules suffer first and then the convoluted ones. Naturally, the medulla more than the cortex suffers the first ill effects of the back pressure. Simultaneously with distention of the tubules, degenerative and atrophic changes occur, which constitute the third stage. The epithelium gradually becomes impaired until it disappears altogether. The glomeruli are the last special renal structures to yield, flattened remnants of which are found frequently in the thin walls of markedly hydronephrotic kidneys. The fourth process in the development of this lesion is fibrosis. This is most evident comparatively late, though it begins before the tubules are obliterated and before the epithelium has vanished. Both the hydronephrotic sacs and the thick-walled little atrophied kidneys are composed almost exclusively of fibrous tissue.

The hydronephrotic changes occurring after ureteral obstruction may be summarized under four heads: (1) circulatory disturbances, (2) canal dilatation, (3) parenchymatous degeneration and atrophy, and (4) cirrhosis, each stage overlapping to a large extent the adjacent ones.

The essential gross changes of hydronephrosis and renal atrophy are so simple and almost self-evident that they need no description

* Quoted by Pratt.

† Pratt, J. H. The Internal Function of the Pancreas, *Jour. Am. Med. Assn.*, 1912, lix, 322-326.

here. Reference to the pictures of the writer's specimens is sufficient. One important point, however, which might be overlooked, ought to be mentioned, namely, that it has been noted very uniformly that when secondary atrophy follows hydronephrosis and hydroureter, the ureter still remains dilated, not participating to any considerable extent with the kidney in its diminution in volume. This point serves to distinguish secondary from primary atrophy, for in the latter little or no enlargement of the ureter occurs, and hence when found later is approximately normal in size.

Changes in Other Organs.—These have been noted by a few observers but seem to be neither very extensive nor very constant and hence of no great importance. For example, Amos found the suprarenal organs congested in most of her guinea-pigs but not visibly affected in her rabbits. The liver, on the other hand, was congested in all of her animals except one, while all of the other organs were normal.

II. TOXEMIA, ETC., FOLLOWING LIGATION OF ONE URETER.

Most of the facts gleaned from the literature concerning this subject are presented in condensed form in Table III. A reading of this will show that as far as the general condition of the animals is concerned, there is but very little evidence (chiefly that of Amos) that complete obstruction of one ureter produces noticeable toxemia. Likewise, reabsorption from the renal pelvis even under high intrarenal pressure is very slight, at most. The other kidney usually is described as being approximately normal in appearance, sometimes slightly enlarged. This finding agrees with the well-known experimental fact, as shown especially by Sampson and Pearce,* that removal of one kidney produces few if any changes in the corresponding organ, while the whole of one kidney and half of the other may be removed with a mortality of only 50 per cent. resulting from renal insufficiency. Anuria is one of the smallest if not the least of all the possible dangers of unilateral ureteral occlusion.

*Sampson, J. A. and Pearce, R. M. A Study of Experimental Reduction of Kidney Tissue with Special Reference to the Changes in That Remaining, *Jour. Exper. Med.*, 1908, x, 745-758.

TABLE III.—TOXEMIA, ETC., FOLLOWING LIGATION OF ONE URETER.

Writer or investigator	General evidence of toxemia	Reabsorption	Other kidney
Amos.....	Rabbits lived average of 52 days; guinea-pigs, 10 1/2 days. Attributed deaths to renal toxins. (Contrast with Bainbridge.)	.....	Frequently enlarged and congested. Sometimes no macroscopic changes.
Néfédieff.....	Toxic substances which were already present in the cells of the kidney may enter the circulation.		
Albarran.....	General well-being of animals not disturbed; yet says the great danger to a patient is the absorption of renal toxins.		
Bainbridge.....	Temporary loss of weight. Within two months condition as good as or better than before operation. (Contrast with Amos.)	None of KI, with 50-80 mm. of Hg. Intraureteral pressure.	
Corbett.....	Fluid from ligated side "had no nephrotoxic properties whatever."	.....	Changes here sometimes may be due to "presence of no longer functioning kidney."
Scott.....	The excellent postoperative condition of his dogs seems to preclude possibility of toxemia from any source.	.....	Normal or somewhat enlarged.
Beer.....	Condition of animals good, if no infection. No toxemia.		
Frank and Bauldauf.	Five animals died as result of operation. Rest showed no symptoms of toxemia nor of any other disorder.		
Barney.....	No evidence of the production of toxins by the pathological kidney. No case of anuria in 33 animals; once, in 62 human cases.	.....	No marked change.

TABLE III.—TOXEMIA, ETC., FOLLOWING LIGATION OF ONE URETER.—*Continued.*

Writer and investigator	General evidence of toxemia	Reabsorption	Other kidney
Lindemann.....	Postoperative condition of animals usually good.	Observed somewhat with increased intra-ureteral pressure.	
Sollman, Williams and Briggs.	Of four animals, two died of unknown causes, and one was in poor condition.	Occurs simultaneously with secretion in such manner as to increase somewhat soluble solids.	Slight hyperemia and slight hypertrophy.
Henderson.....		Water markedly, under slight intra-ureteral pressure; indigo carmin, slightly.	
Pearce.....			At first, congestion and swelling; later slight hyperplasia.
Straus.....			Almost twice normal size.
Robinson.....	No anuria in four dogs..		
Bradford.....	No anuria in four dogs.		
Albarran and Bernard.	Renal cytotoxines are of doubtful existence; experimental evidence.		
Summary.....	3 = more or less toxemia. 11 = no evidence of any toxemia.	Water = freely Other substances = none or slightly.	Usually = slight enlargement and congestion.

III. RENAL RECUPERATION AFTER COMPLETE OBSTRUCTION OF THE URETER.

Table IV gives in concise form most of the pertinent data which the writer has found in the literature concerning this phase of the subject. Following is a summary of this table:

Complete ureteral obstruction for	$\left. \begin{array}{l} 3 \text{ weeks (Corbett)} \\ 3 \text{ weeks (Kawasoye)} \\ 6 \text{ weeks (Robinson)} \\ \text{---} \\ 4 \text{ weeks (Average)} \end{array} \right\} = \text{Total loss of function.}$
Same	$\left. \begin{array}{l} 3 \text{ weeks (Beer)} \\ 4 \text{ weeks (Nicolai)} \\ 6 \text{ weeks (Bradford)} \\ 8.5 \text{ weeks (Bainbridge)} \\ \text{---} \\ 5.5 \text{ weeks (Average)} \end{array} \right\} = \text{Some function still remaining.}$
Same	$\left. \begin{array}{l} 14 \text{ weeks (Scott)} \end{array} \right\} = \text{Complete renal restoration.}$

The cases of Barney, and Hayd were of too short duration and the experiments of Sollman, Williams, and Briggs were too insufficient to be classified in the above summary. The results of the rest of the investigators surely are about as contradictory as one could imagine. In a word, they mean the impossible—the longer the duration of the renal stenosis the smaller the amount of damage done to the kidney. One point which may help to account for this disparity in some instances is the lengths of time each investigator allowed for the kidney to recover. Of course, the longer one waits, other things being equal, the more conclusive will be his results. Corbett waited thirty-seven to seventy-four days and Scott six to forty days; the former found total loss of function after about three weeks of complete ureteral obstruction, and the latter, complete restoration after fourteen weeks of similar occlusion. Also, the kind of functional test used may possibly account for some of the discrepancies. The most convincing method is the removal of the opposite kidney at the same time or immediately after the lumen of the closed ureter is restored; in this manner, the test of the impaired kidney in regard to its functional sufficiency is made absolute. Furthermore, the formation of an external fistula adds an unavoidable complication of more or less renal infection.

The situation in regard to our knowledge of renal restoration after ureteral obstruction is summarized best by saying that it is in an absolutely chaotic condition. Nothing but a large amount of careful research will give us our bearings.

IV. INTRAURETERAL PRESSURE.

Very satisfactory agreement is found in the literature concerning this subject. A résumé is given in Table V. In dogs, the average maximum intraureteral pressure which may be obtained by inserting a cannula into a normal ureter leading from a healthy kidney is about 66 mm. Hg. The pressure at which ureteral contractions cease is

about 30 mm. Hg (Henderson). In rabbits, this same investigator finds that ureteral activity disappears at about 12 mm. Hg. It has been observed by several workers that a slight rise in pressure stimulates renal secretion (see Edes, Table V). Furthermore, it has been shown by several investigators without controversy that after a sudden complete closure of the ureter, there occurs a rapid rise of intraureteral tension, which reaches a maximum in a few hours, and is followed during the next few weeks and months by a gradual decline (see Bainbridge, and Rosenow, Table V). Our knowledge of the relation between intraureteral pressure and blood pressure seems to be in a rather confused state. (For summary of literature on experimental ureteral obstruction, see p. 403.)

B. THE WRITER'S RESEARCHES ON COMPLETE URETERAL OBSTRUCTION.*

Technic.—Everything used in each operation was boiled thoroughly, including even scalpels and needles. Preparation of the animals consisted in shaving followed by scrubbing with soap and water; they were then wiped dry, alcohol was applied, and the skin was dried again. Ether was used next. Lastly, full strength tincture of iodine was applied. In a very few instances, it was possible to have the dog shaved the day before so that at the time of operation it was not necessary to use any water; thus by acting on the dry skin, the penetrating power of the iodine was increased. I had but little trouble with skin contamination as compared with the frequent infection of the deeper structures. As soon as the incision was made, the exposed tissues were protected from contact with the skin by covering the edges of the wound with towels held in place by towel clips and spread out over the surrounding field.

Ten of the operations were performed extraperitoneally and forty-two intraperitoneally. On the upper portion of the ureter, the operation is done easily, without opening the peritoneum; but in dealing with the lower portion, it is very difficult not to break through this membrane, which is so extremely delicate in the dog. The extraperitoneal route did not give better results locally nor was the mortality lower by this method. Ether was used exclusively as the anesthetic.

In no instance was the ureter ligated *in situ*, as practised by Frank and Baldauf. I always dissected it out for a short distance, being careful, however, to preserve the ureteral artery; if this pre-

* A large portion of this work was done in the research laboratories of Northwestern University Medical School. The writer hereby thanks his alma mater most sincerely for this courtesy.

TABLE IV.—RENAL RECUPERATION AFTER COMPLETE OBSTRUCTION OF THE URETER.

Investigator	Duration of obstruction	Time allowed for recuperation after removal of obstruction	Other kidney	Results	Remarks
Corbett	6-10 days. 24 days.	37-74 days.	Nephrectomy on same day to 8 days after second operation.	Incomplete restoration of renal function. Total loss of function.	Ureteral lumen restored by "removal of ligature."
Kawasoye	4 hours.	First series; obstruction intact.	Control.	No blue in urine after 4 hours. No blue in kidney after 24 hours.	Indigo-carmin test.
	36 days.	Second series; 57 days after removal of obstruction.		No blue in urine after 21 days. Total loss of function.	External fistula produced at second operation.
Robinson	6 weeks.			Total loss of function.	No details given.
Beer	3-4 weeks.		Nephrectomy.	"Sufficient parenchyma persists to warrant an attempt at secondary implantation of the ureter into bladder."	
Nicolai	40-60 days.	Not ascertained.	Control.	Kidney tissue still has power to secrete.	
Bradford	11-40 days.	2-3 weeks and longer.	Control for anatomical comparison.	Kidney returns to normal shape but only one-fourth to one-third normal size.	External fistula produced at second operation.
Bainbridge	2 months.	None.	Urine obtained from this as control.	Function of kidney "not lost." Can still secrete water and nitrogenous constituents.	Urine collected directly from ureters. Diuresis stimulated by subcutaneous normal saline solution.
Scott	19-97 days.	6-40 days.	Control for anatomical comparison.	Function and size completely restored after removal of obstruction.	Lumen restored by uretero-ureteral anastomosis. Infection of renal parenchyma occurred after each secondary operation.
Sollman, Williams and Briggs.	77 days. 185 days.	None. 78 days.	Control.	A little urine for 1 1/2 hours; then complete cessation of secretion. Total loss of function.	Number of animals (2) too small; one died during experiment. Results not conclusive.
Barney	10 da.	Months to years.	Undisturbed.	Integrity of kidney not destroyed.	Human cases.
Hayd	17 days.	40 days.	Undisturbed.	Kidney weight, 5 ounces. Cortex, 1/4 inch thick. Pelvis and calices distended.	Human case. Spontaneous uretero-vaginal fistula on seventeenth day. Nephrectomy on fifty-seventh day.

For summary of this table, see p. 348.

TABLE V.—INTRAURETERAL PRESSURE.

Investigator	Kind of animal	Previous ureteral obstruction	Intraureteral pressure	Results	Blood pressure	Remarks	
Henderson.....	Dogs.	.....	26 to 32 mm. Hg.	Disappearance of ureteral contractions.	.....	Stimulation of splanchnic nerves often will start contracting again in ureter seemingly paralyzed by pressure.
	Rabbits.	.....	8 to 16 mm. Hg.	Same.	.....	
		
Bainbridge.....	Not stated.	.....	Slight artificial rise.	Increased rate of ureteral contractions.	Ureteral pressure determined mainly by blood pressure; therefore not a secretion pressure.	
	Cats.	9 days.	.....	37 mm. Hg.	160 mm. Hg.	
	11 days.	39 mm. Hg.		150 mm. Hg.
	12 days.	34 mm. Hg.		Not stated.
	16 days.	17 mm. Hg.		Not stated.
Lindemann.....	.....	.....	.....	12 mm. Hg.	.....	No appreciable lessening of the flow of blood through the kidney. Intraureteral pressure has no relation to general blood pressure.
	.....	.....	40 mm. Hg.	No appreciable lessening of the flow of blood through the kidney. Intraureteral pressure has no relation to general blood pressure.	.....	
Lindemann.....	.....	.....	40 mm. Hg.	No appreciable lessening of the flow of blood through the kidney.	.....	No appreciable lessening of the flow of blood through the kidney.

TABLE V.—(Continued.)

Investigator	Kind of animal	Previous ureteral obstruction	Intraureteral pressure	Results	Blood pressure	Remarks
Robinson	Dogs					
Guyon and Albarran			70 mm. Hg.	Cessation of renal secretion.		
Cohnheim			50 to 60 mm. Hg.	Same.		
Lepine and Poeteret (Quoted by Frank and Baldauf).			50 mm. Hg.	Same.		
Edes			Small amount.	Increased flow of urine.		Urethral obstruction may cause vesical dilatation, which may result in hydronephrosis, if ureterovesical valve is not intact.
			12 mm. Hg.	Great impairment of flow.		
			40 mm. Hg.	Complete cessation of flow.		
Barney	Dog	30 weeks.	30 mm. Hg.			Only one animal used. Insufficient data. Intraureteral pressure higher than average of other investigators.
Rosow	Dogs	1 day. 7 days. 13 days. 15 days. 23 days. 35 days. 225 days. 263 days.		94 mm. Hg. 43 mm. Hg. 22 mm. Hg. 60 mm. Hg. 47 mm. Hg. 22 mm. Hg. 21 mm. Hg. 6 mm. Hg.		

TABLE V.—(Concluded.)

Investigator	Kind of animal	Previous ureteral obstruction	Intraureteral pressure	Results	Blood pressure	Remarks
Obniski.....	Dogs.	None.	Rises, 1-3 hr. Stationary, 10-14 hr. Falls a few hr. till death of animal. Maximum pressure = 62-82 mm. Hg.†	Maximum pressure = cessation of renal secretion.	Normally, ureteral pressure curve and blood pressure curve rise and fall together. Diuresis = ureter curve climbs suddenly to blood curve.	
Guyon.....	Dogs.	None.	Maximum = 65 mm. Hg. Reached in 1 hr.	Cessation of renal secretion.		
Gogtidse.....	Dogs.	.....	Maximum = 50 mm. Hg. in 97-240 min.	Cessation of renal secretion.		In all of his animals, diuresis with intravenous salt solution.

caution is observed, the ureter may be separated from its bed for several inches and its vitality will not be impaired. There is considerable difficulty in pulling the ligature just tightly enough so that it surely will produce obstruction but not cut through and allow leakage of urine. The material in every case was linen, and usually a large size was selected. Nearly always two ligatures were used, placed about five-eighths of an inch apart. It was not considered advantageous to sever the ureter nor to resect a portion of it between them. With the last three or four animals, only a single ligature was employed and the finest commercial size of linen obtainable. It was drawn very tightly and was prevented from cutting through the wall of the ureter by a piece of fascia obtained from the sheath of the rectus abdominis and wound around the ureter underneath the ligature. I have made use of this procedure to some extent also in ligating the Fallopian tube; and it seems to hold excellent promise of being an effectual method of establishing complete closure of a duct without cutting through the wall.

In four of the dogs, the ureter was ligated about midway between the kidney and the bladder; in one-half of the remainder, as close to the pelvis of the kidney as possible and in the rest, at the bladder.

The abdomen was closed in three layers with fine catgut in the peritoneum, coarser catgut in the fascia, and coarse linen in the skin. In the last three or four dogs, finest silk was used exclusively for all sutures and ligatures throughout the entire operation, except fine linen for ligating the ureter. This was done after reading the article of Halsted* on the advantage of finest silk for all sutures and ligatures in aseptic surgery and after hearing the paper of Courtenay† concerning the superiority of human hair and other fine ligature material in intestinal suturing. These men maintain that the coarse material excites so much reaction in the tissues that they are weakened by it so that the suture will cut through more easily in spite of its larger diameter. Fine material, on the other hand, allows healthy tissue to preserve its integrity and to resist far more successfully the cutting effect of the suture even though it be of small size. Also, union occurs more rapidly with fine material. Up to the present time, my experience both in dog experiments and in human surgery confirms the above arguments.

After closure, all wounds were painted with tincture of iodine. In most cases, no dressing was applied; sometimes collodion or other

*Halsted, W. S. Ligature and Suture Material, Etc. *Jour. Am. Med. Assn.*, 1913, lx, 1119-1126.

†Courtenay, G. C. Experimental Study of Intestinal Sutures. *Illinois Med. Jour.*, 1913, xxiv, 166-170.

protection was used but it usually was of little value, as the dogs very soon licked or scratched it off.

Results of Personal Experiments.—From the 52 dogs used in this work, 44 pairs of kidneys were obtained, which fall naturally into four groups as follows: I, 6 hours to 9 days, 15 specimens; II, 11 days to 56 days, 11 specimens; III, 76 days to 363 days, 11 specimens; and IV, 79 days to 181 days, 7 specimens. They were all fixed and preserved by the Kaiserling method.

The gross pathology and its relations to the general condition of the animal were investigated almost to the exclusion of microscopical study, for two reasons: (1) the microscopical changes have already been worked out satisfactorily; (2) the chief object of these researches is the discovery of the final fate of the kidney *as a whole* after ligation of its ureter, especially as to whether it still is a menace to the animal or whether it assumes a more or less harmless state. This is the chief if not the exclusive fact which we must know if we are to ascertain the clinical results of accidental ureteral occlusion and in order to answer the question whether intentional ureteral obstruction is ever a safe and desirable procedure.

Group I.—In this are included the following 15 specimens: one, 6 hours; two, 12 hours; one, 1 day; one, 1 1/2 day; two, 2 days; one, 3 days; two, 3 1/2 days; one, 4 days; one, 5 days; two, 6 days; and one, 8 days. No marked gross changes occurred in any of these kidneys. The almost exclusive lesion found was slight or moderate hydronephrosis and hydroureter. In the earlier stages, especially during the first few hours, the ureter is dilated proportionately more than the kidney (Fig. 1A). This disparity is due, of course, to the thinness of the walls of the duct which yield more readily than the thick-walled kidney.

The duration of the ureteral obstruction determines, on the whole, the degree of the dilatation; for instance, the distention at three days is twice that at a day and a half. Within narrow limits of time, however, there is much lack of uniformity in this respect; for example, one of the twelve-hour specimens is dilated nearly as much as the three-day one, while the one-day obstruction produced less distention than either of the twelve-hour ones. Similar variations have been observed by many other experimenters; but on the average, not considering intervals of less than about three days, the longer the obstruction the greater the hydronephrosis. The contained fluid in every case was clear.

The location of the ligature in each dog was either as close to the bladder as possible or at the renal pelvis; in seven 6 hours, 12

hours 1 1/2 days, 1 of the 2 days, 3 days, 1 of the 3 1/2 days, and 6 days), it was low; and in eight (1 of the 12 hours, 1 day, 1 of the 2 days, 1 of the 3 1/2 days, 4 days, 5 days, 1 of the 6 days, and 8 days), it was high. In this group, the level of the ligature makes no discoverable difference whatever in the results.

In the 6-hour specimen, with moderate pressure and equal on both sides, the ligated ureter was distended to three and one-half times the capacity of the normal one. In the 12-hour dog, the com-

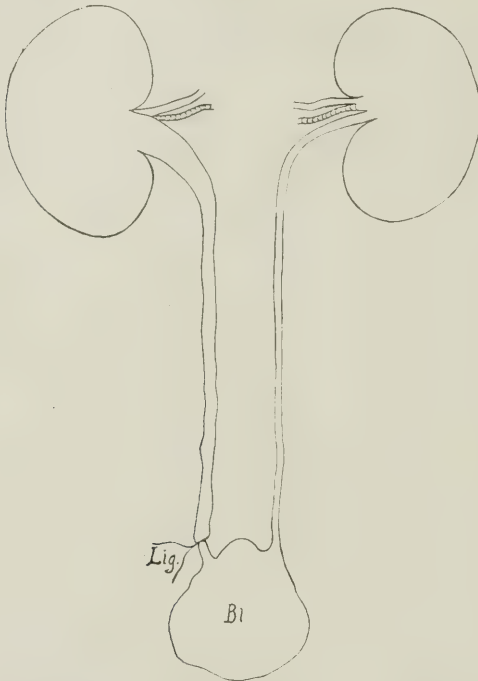


FIG. 1.—Kidneys, ureters and bladder, three days after ligation of right ureter; made by tracing fresh specimen. *Bl.*, urinary bladder. *Lig.*, ligature. Note the rather marked dilatation of the ureter as compared with the very slight enlargement of the kidney on the side of the ligature.

mon bile duct was ligated at the same time with the ureter. In removing one of the 3 1/2-day specimens, leakage of intraureteral fluid occurred at the upper ligature. This, I feel sure, was due to the manipulations at the autopsy and not to a spontaneously formed fistula.

The ages of the dogs in this group I know nothing about except that the 56-day one was only four months old at the

time of operation. This animal also developed the most marked pyonephrosis in this group.

The kidney on the side of the obstruction in practically every dog was hyperemic and edematous and somewhat enlarged; the one on the opposite side revealed no gross abnormalities.

The causes of death in this group were as follows: Two (6 hours and 1 of the 12 hours) were chloroformed. Two (1 of the 12 hours, and 2 days) died from causes arising solely from the operation. The 1-day dog died from intra- and peri-renal hemorrhage, due apparently to rupture of a blood-vessel in which extreme hyperemia had been induced by the operation; the ligature had been placed as close as possible to the kidney pelvis. The 1 1/2-day dog and one of the 3 1/2-day animals were infected to a small extent, the former in the abdominal wound, and the latter around the kidney; in the other 3 1/2-day, the 5-day and the 8-day dogs, the infection was marked, being located with the first in the peritoneum, with the second in the abdominal wound, and with the third in the retro-peritoneal tissues (abscess). Death in the case of these five infected dogs was due both to infection and to the weak condition of the animals before operation; also, inefficient after-care was a contributing factor. The 3-day, 4-day, and one of the 6-day dogs all died without apparent cause, unless it was their poor condition and the insufficient after-treatment; this 6-day dog also had a slight skin infection. The postmortem on one of the 2-day dogs was done by an assistant, and the cause of death was not ascertained. The other 6-day dog died from acute dilatation of the stomach and also had a bad infection of the abdominal wound. The greater part of the mortality in this group seems to be due to three factors: (1) low vitality of the dogs, (2) poor care after operation, and (3) unskillfulness of assistants. All of these disadvantages were largely removed with the later dogs.

Group II. This series includes eleven specimens as follows: one each 9, 11, 12, 13, 14, 17, 26, 29, 38, 39, and 56 days after ligation of the ureter. In this group, marked pathological changes are very manifest. In six of them (11, 12, 26, 29, 39, and 56 days), the ravages of infection are so marked that one could not imagine secondary atrophy to be possible. The other five (9, 13, 14, 17, and 38 days) exhibit less marked lesions; four of them are shown in Figs. 2, 3, 5A, 5B, 6A and 6B. It is easily conceivable that in these, regressive changes might supervene so that they would appear ultimately like those shown in my atrophy series (Group IV). Whether such changes develop, depends largely at least on the presence of infec-

tion and, if present, its virulence and the resistance of the animal.

All of the specimens in this group show gross signs of infection except the 9-, 14-, and 38-day stages; also, in the 12-, 13- and 17-day kidneys the infective lesions might be a great deal worse. The 29-day specimen (Fig. 4) illustrates what extreme pathological changes may develop in a comparatively short time. This organ suffered

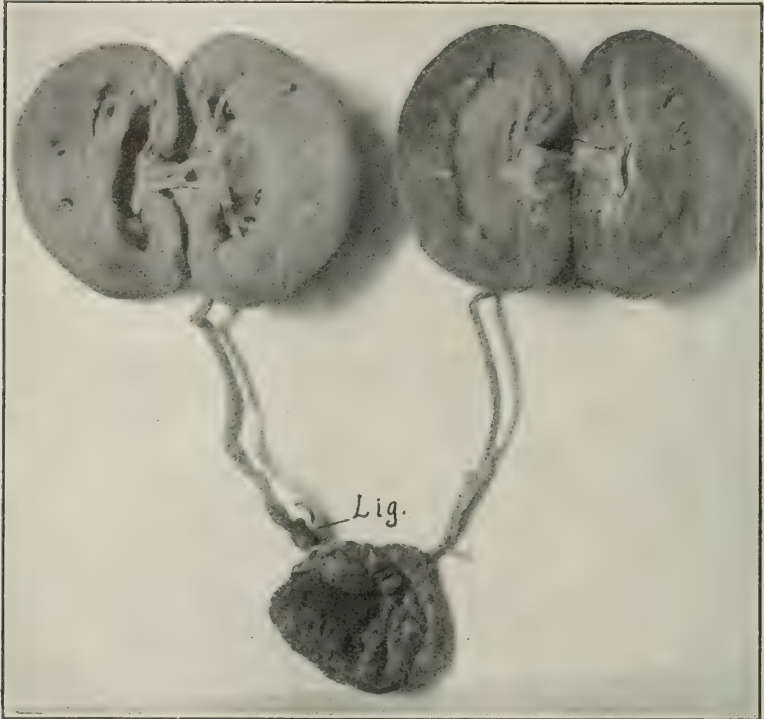


FIG. 2.—Interior of kidneys shown in Fig. 1. Both halves of the kidney on the ligatured side are dilated equally, although this fact is not shown in the photograph. The ligatured ureter is collapsed on account of the escape of its contents.

from extreme infection, which worked its way through the upper pole. At this juncture, secondary hemorrhage occurred and the blood was poured out around practically the entire kidney underneath its capsule; then, a little distance down from its superior pole and on the convex surface of the kidney, the capsule was ruptured and also about the same time the peritoneum was pierced, and the

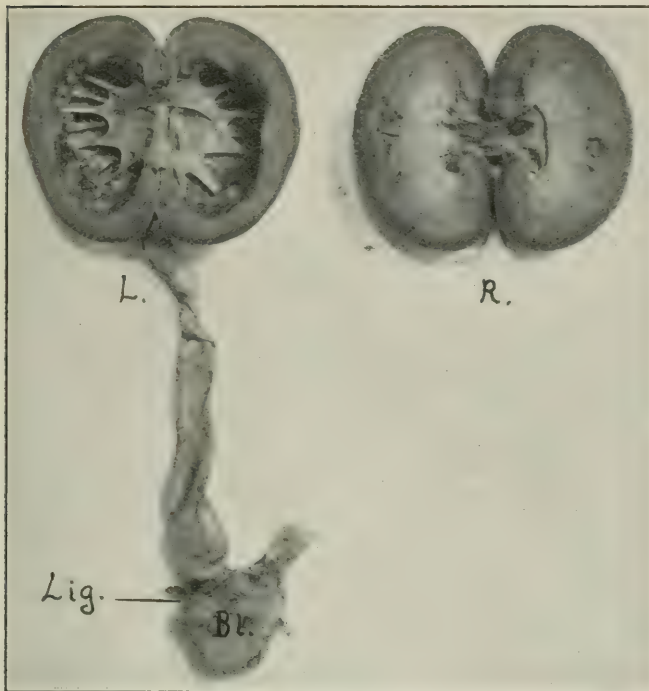


FIG. 3.—Kidneys, one ureter and bladder, thirteen days after ligation of left ureter. *Bl.*, urinary bladder. *Lig.*, point of ligature. *L.*, left kidney. *R.*, right kidney. The ureter is collapsed on account of the escape of its contents. The left kidney is markedly cystic and was filled with pus. Compare Fig. 4, left kidney, which is practically the same age, but contained a clear fluid; the dilatation is very much less in the latter.

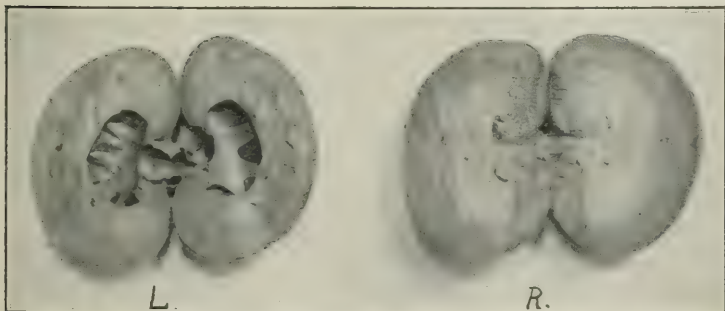


FIG. 4.—Kidneys, fourteen days after ligation of left ureter at the renal pelvis. *L.*, left kidney. *R.*, right kidney. The left one was filled with clear fluid. Note the small amount of dilatation as compared with Fig. 2, *L.*, in which the cystic kidney was filled with pus.

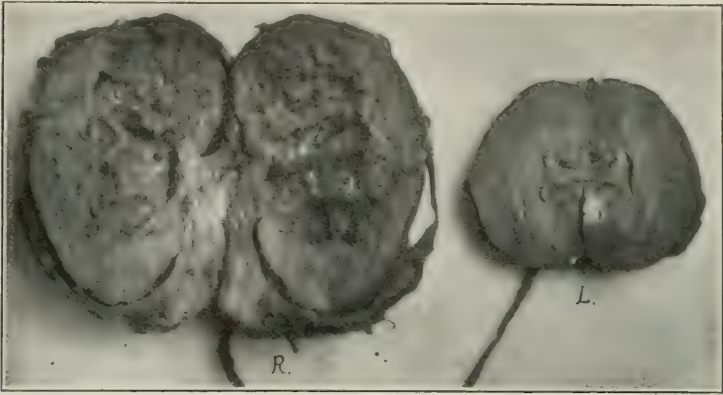


FIG. 5.—Kidney, twenty-nine days after ligation of right ureter at the renal pelvis. *L.*, left kidney. *R.*, right kidney. The left one illustrates the extreme pathology which may develop as a result of severe infection complicated by profuse secondary hemorrhage.

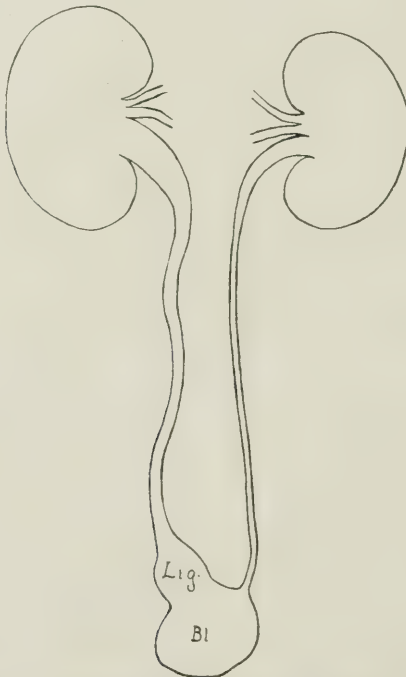


FIG. 6.—Kidneys, ureters and bladder, thirty-eight days after ligation of right ureter; drawing made by tracing from fresh specimen. *Bl.*, urinary bladder. *Lig.*, mass of connective tissue around ligature. Note that the distention of the ligatured ureter is only moderate, not more than that shown in some three day specimens (Fig. 1). Compare Fig. 7.

blood flowed out into the peritoneal cavity. This hemorrhage killed the dog.

Some of the kidneys in this group illustrate ideally the effect that moderate infection has in hastening cyst formation. Fig. 2, L shows a kidney in which moderate infection occurred. Note that the cortex and medulla are markedly thinned but that the external dimensions are about the same as those of its mate. Also more especially, compare with Fig. 3, L a kidney whose ureter had been

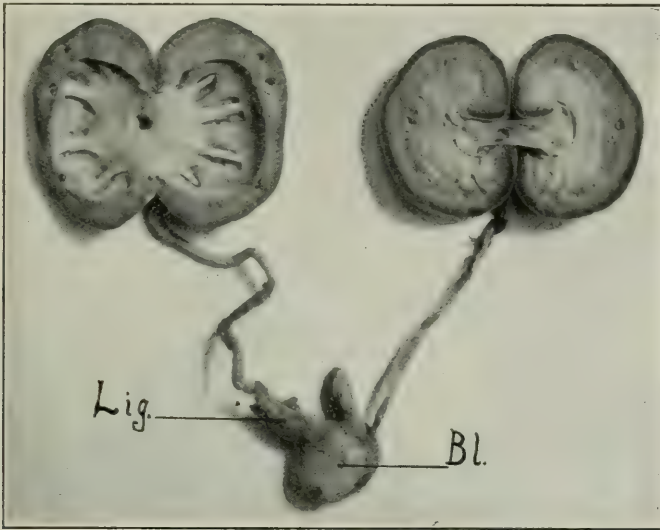


FIG. 7.—Interior of kidneys shown in Fig. 6. Note the marked sacculations of the kidney on the ligated side, without much relative increase in size externally. The ligated ureter has collapsed because of the escape of its contents.

ligated practically the same length of time but which had suffered little or no infection. The former contained pus, the latter a clear fluid. In older specimens, still more difference may be noted between infected and noninfected kidneys, as may be seen by comparing Figs. 5B and 6B. Furthermore, it is easily conceivable that the kidneys shown in Figs. 3, L and 5B and even the one in Fig. 2, L might ultimately have become atrophied, like those of Figs. 9, 11, etc., if they had been allowed sufficient time.

Only one kidney in this group exhibits marked sacculations; this is the 56-day specimen, the oldest one in this series. It was filled with cream-colored pus, some of which was coagulated and very adherent to the inner wall of the sac. This kidney looks almost

exactly like the one shown in Fig. 8, but is only about one-quarter as large.

As to the height of the ligature in this group, in six (11, 12, 14, 17, 29, and 39 days) it was high (close to the kidney); in four (13, 26, 38, and 56 days), it was placed low (close to the bladder), while in one (9 days), it was about midway between the kidney and the bladder. Here, as in Group I, the level of the ligature seems to make no difference in the results.

Concerning the causes of death in this group, in the 11-, 12-, 17-, 26-, 29-, and 56-day dogs, there was enough infection in or around the kidney to account mostly for the fatal outcome. The 39-day

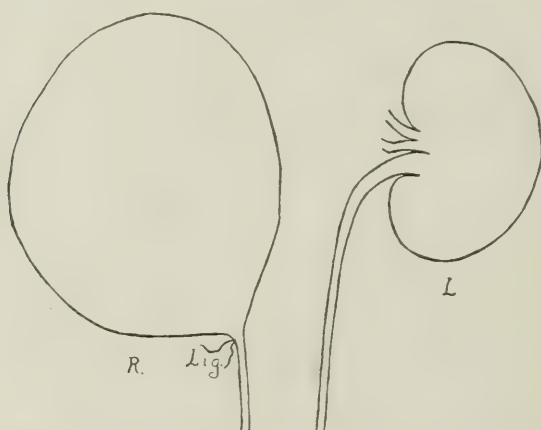


FIG. 8.—Kidneys, thirty-nine days after ligation of right ureter at the renal pelvis. *R.*, right kidney. *L.*, left kidney. *Lig.*, ligature. The right kidney was filled with pus; note the extreme sacculatation and the obliteration of its normal shape. Compare Fig. 6, which shows a kidney of approximately the same age, which contained a clear fluid. Compare Fig. 9.

specimen also was badly infected, but this complication did not produce death. In the 9-day dog, the cause of death was not apparent; the abdominal wound was slightly infected. No gross signs of infection were discoverable in the 14- and 38-day dogs; the hydronephrotic fluid was clear. Only the kidney on the ligatured side was removed from dog 11 on the fourteenth day; eleven days later he died from secondary hemorrhage from the stump of the renal vessels, and then the other kidney was obtained.

It is instructive to notice that in the 26-day animal, the non-ligatured kidney showed a moderate grade of hydronephrosis although there was no mechanical obstruction of the ureter. However, there were multiple small abscesses in the parenchyma. This

kidney illustrates a fact that Barney has demonstrated experimentally, that intrarenal and intraureteral infection without ureteral obstruction will produce hydronephrosis.

Urotropin was given to the 56-day dog, 12 grains daily for six days and then 22 grains daily for twenty days. This drug seemed to have little or no effect in stemming the infection, which ultimately caused the death of the animal. Compare with 204-day dog (Group III), in which the results were very similar.

Concerning the ages of the dogs in this group, I know nothing except that the 56-day animal, which developed the most marked sacculatation of all, was only four months old when operated upon.

Group III. As already stated, one cannot reasonably expect to find general renal atrophy before the sixtieth day after ureteral

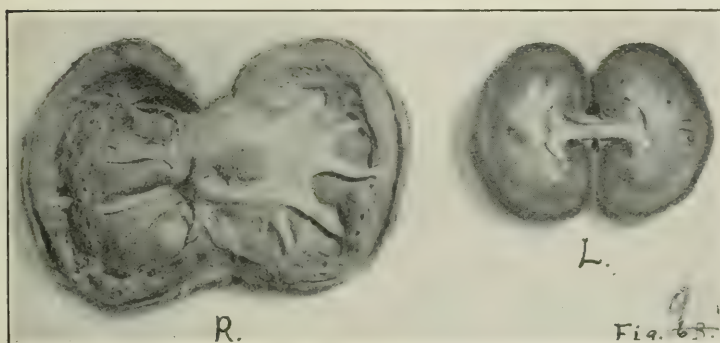


FIG. 9.—Interior of kidneys shown in Fig. 8. *R.*, right kidney. *L.*, left kidney. The right one was filled with pus. Compare Fig. 7, which illustrates a specimen of approximately the same age but with little or no infection.

ligation. Hence, my eighteen specimens beyond this time limit I have separated into two divisions, putting those which show more or less enlargement into Group III and those which exhibit general atrophy into Group IV. The essential facts concerning Group III are shown in Table VI. From these data, it is evident that time alone does not determine the amount of renal dilatation; for the 270-day kidney shows the greatest enlargement, while the 345-day specimen is one of the two smallest in this group. (See Figs. 7A and 7B; the 345-day kidney is almost exactly like this one.) The 91-, 161-, and 363-day specimens are all dilated to about the same degree, which is also the average for the whole group, that is, 4.5 to 5 times the size of the other kidney.

TABLE VI.—HYDRONEPHROSIS SERIES (GROUP III).

		Hydronephrosis								
Dog No.	Age of specimen	Position of ligature	Compared with other kidney	General character	Renal contents	Infection	Perirenal adhesions	Ureteral dilatation above ligature	General condition of animals	Route
55	76 days.	Close to bladder.	2.5	Thin-walled cyst.	Turbid straw-colored fluid; acid reaction; albumin +; bacilli, cocci, leukocytes and erythrocytes.	+	Few.	Marked.	Excellent, after first few days.	Intraperitoneal.
23	91 days.	Close to bladder.	4.5	Thin-walled cyst.	Chocolate-colored semi-solid material; bacillicocci, leukocytes and erythrocytes.	+	Moderate.	Marked.	Excellent, after first week or ten days.	Intraperitoneal.
28	149 days.	Close to kidney.	3.5	Thick-walled cyst.	Dark, yellowish, malodorous pus.	+	Marked.		Poor, nearly all of the time. Mangy.	Intraperitoneal.
47	152 days.	Close to kidney.	1.8	Very thin-walled cyst.	Reddish thin pus; bacilli, cocci, leukocytes and erythrocytes.	+	Moderate.		First 3 mo., excellent; last 2 mo., poor. Mangy.	Extraperitoneal.
52	161 days.	Close to bladder.	5.0	Very thin-walled cyst.	Chocolate-colored fluid; specific gravity 1.027; cocci, leukocytes and erythrocytes.	+	Moderate	Marked.	Excellent after first few days. Slightly mangy.	Extraperitoneal.
53	172 days.	Close to kidney.	1.5	Very thin-walled cyst.	Cloudy semipurulent fluid; looks like cloudy urine; acid reaction; cocci, leukocytes and erythrocytes.	+	Moderate.		Very poor, at time of death.	Extraperitoneal.
45	185 days.	Close to kidney.	5.0	Very thin-walled cyst.	Thin chocolate-colored pus; nonodorless; specific gravity 1.021; cocci, leukocytes and erythrocytes.	+	Moderate.		Good, First 3 mo., poor, last 3 mo. Mangy.	Extraperitoneal.

Here, as in the preceding groups, the location of the ligature does not seem to influence the results. In seven which were ligated high, the average dilatation equalled 4.1 times the size of the opposite kidney; in four which were ligated low, the enlargement was five times the size of the other kidney. It seems quite possible that the two smallest ones (Figs. 7A and 7B) might have undergone general shrinkage if the dogs had been allowed to live a few weeks or months longer.

Perirenal adhesions were present to some extent at least, in every case. This point is mentioned because Barney, Lindemann and others claim that the development of hydronephrosis depends upon capsular anastomosis.

In regard to the ages of these animals, I know positively that the 204-day dog, in which the cystonephrosis was next to the largest, was only about four months old when operated upon. Also the 91-, 161-, and 270-day dogs appeared to be at least moderately young. Concerning the rest in this group, I can venture no opinion as to their ages.

The 204-day dog was given urotropin, 12 grains daily for six days and then 22 grains daily for twenty days. This drug had no apparent effect, as also was the case with the 56-day dog.

Only one dog in this group died spontaneously (fifty-three days); the rest were killed at selected intervals. The other points in Table VI are sufficiently explained in the summaries at the bottom of each column.

Group IV. This is the most significant series among all of my experiments. These seven general atrophies in which the total size of each kidney is more or less diminished as compared with its mate, constitute an unusually large number to be found by a single investigator. The question arises at once, why this striking result.

The duration of the obstruction is not the determining feature, for in Group IV with an average time of 188 days after ligation, there was an average *dilatation* to 4.5 times the size of the other kidney (Table VI). In this series with an average duration of 171 days, there is an average *shrinkage* of more than 50 per cent. (Table VII).

Moreover, these atrophies are not due to the absence of infection, except possibly in the 120- (Figs. 10A and 10B) and the 219-day (Figs. 14A and 14B) specimens; yet in the case of these, we have no proof that there might not have been a slight infection at some earlier stage. However, it is noteworthy that the kidney which was atrophied the least (Figs. 13A and 13B) showed the greatest signs of infection, and those which were shrunken the most (Figs. 10A, 10B,

TABLE VII.—ATROPHY SERIES (GROUP IV).

Dog No.	Age specimen	Position of ligature	Atrophy compared with other kidney	Hydronephrosis	Renal contents	Infection	Peri-renal adhesions	Dilatation of ureter above ligature	General condition of animals	Route
25	79 days.	Close to bladder.	1/2	Small.	Serofluculent slightly purulent fluid.	+	Marked.	Marked.	Good, though mangy.	Intra-peritoneal.
51	120 days.	Midway between kidney and bladder.	1/6	None.	Nothing.	0	Marked.	Slight.	1st 2 1/2 mo., fair; last 1 1/2 mo., poor. Seemed to die of inanition.	Extra-peritoneal.
50	145 days.	Midway between kidney and bladder.	1/4	Moderate.	Small amount brownish pasty material containing bacilli, cocci and leukocytes.	+	Marked.	Marked.	Good, though very mangy.	Extra-peritoneal.
22	186 days.	Close to bladder.	3/4	Marked: 1/2 vol. unopened kidney = hydronephrotic space.	Brownish fluid; looks like turbid urine; contains bacilli, cocci, leukocytes and erythrocytes.	+	Marked.	Marked.	Good, except diarrhea for few weeks during middle of period.	Intra-peritoneal.
36	192 days.	Close to bladder.	19/20	Small.	Reddish nonodororous pus.	+	Marked.	Enormous.	Very sick during first 5 weeks; rest of time fair; at no time as well as before operation.	Intra-peritoneal.
12	219 days.	1/3 distance from kidney to bladder.	1/9	None.	Nothing.	0	Marked.	Marked.	Poor, during 1st 2 weeks; good after that.	Intra-peritoneal.
46	256 days.	Close to bladder.	3/5	Marked: 1/3 vol. unopened kidney = hydronephrotic space.	Fluid. Lost without examination.	? Probably +	Marked.	Very marked.	Excellent, after 1st few days; when killed, very fat though very mangy.	Intra-peritoneal.
Sum- mary of 17 spec- imens	Average, 171 days.	4, low; 3, medium; none high.	Average, 17/40	2, marked; 1, moderate; 2, small; 2, none.	3, fluid, cloudy or purulent; 1, fluid, not examined; 1, semi-solid; 2, nothing.	4 = + 2 = 0 1 = ?	All marked.	1, enormous. 5, marked. 1, slight.	5, excellent. 2, fair. 0, poor.	5, intra-peritoneal. 2, extra-peritoneal.

14A and 14B) were infected the least. Consequently, it seems that the degree of infection may be an important factor. Considering the fact that most if not all of these specimens were infected, it is evident that a high degree of general renal atrophy can take place in the presence of intrarenal infection of moderate degree. If there is little or no infection, the process occurs, no doubt, more rapidly; if the infection is more than moderate, general atrophy does not occur, but there is more or less increase in volume of the kidney. This latter process occurred in all of the kidneys in Group III; however, the enlargement of the two smallest ones (Figs. 7A and 7B) is so slight that they seem really to belong in the atrophy series.

The marked perirenal adhesions of every kidney in Group IV seems to disprove the theory of Lindemann, Barney and others that hydronephrosis depends upon perirenal anastomoses for its development. In fact the adhesions in the atrophy group were much more marked than in the hydronephrosis series.

In regard to the level of the ligature, the fact that in none of the atrophies was the ureter ligated near the kidney seems to point to the conclusion that, other things being equal, obstructions at the renal pelvis do not lead to general atrophy but to hydronephrosis. This observation agrees with the theory of Bell that low occlusions produce atrophy of the kidney while high ones result in hydronephrosis.

The persistence of ureteral dilatation is marked in nearly every specimen in this group. Moreover, the two in which renal atrophy is greatest (Figs. 10A, 10B, 14A and 14B) show the least ureteral dilatation and the one in which the least atrophy of the kidney occurred (Figs. 13A and 13B) exhibited the greatest ureteral distention. Intermediate stages (Figs. 9A, 9B, 11A and 11B) show moderate ureteral enlargement. The conclusion to be drawn from this observation is that the larger the size of the ureter the greater was the amount of primary hydronephrosis. The ureter thus remains as an indicator, not shrinking in proportion with the kidney. For example, the ureter of the 120-day kidney (Figs. 10A and 10B) is but slightly dilated while the one of the 219-day kidney (Figs. 14A and 14B) is considerably enlarged above the ligature and both kidneys have atrophied to approximately the same small size. In the first organ, the atrophy began early and therefore the ureter was not greatly impaired by stretching; in the second, the renal shrinking began so late that the ureter on account of its great distention was not able to recover its original size. None of my specimens, however, show the extreme disparity illustrated in one of Tait's figures in which

an extremely atrophic kidney does not measure more than twice the diameter of its enormously dilated ureter.

The age of the animal may be of considerable importance in determining general renal atrophy. The two dogs in which atrophy was most marked (Figs. 10A, 10B, 14A and 14B) surely were not young and appeared to be rather old. Dog 36, whose kidney showed the most marked infection and the least atrophy of any in this group I know positively was less than a year old. Concerning the ages of the other animals in this series, I have no data.

In comparing Groups III and IV, we find that out of a total of eighteen dogs, the seven of the latter group were all reduced to a size smaller than normal and to a condition entirely harmless to the

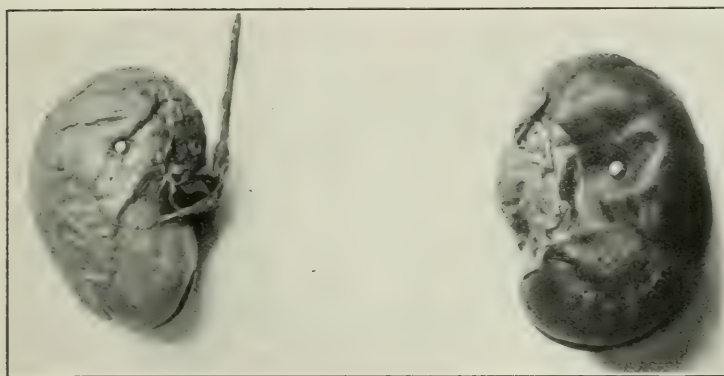


FIG. 10.—Kidneys 172 days after ligation of left ureter at the renal pelvis. *L.*, left kidney. *R.*, right kidney. The left one is one of the two smallest in Group III. These two are so near the border-line of the general atrophy series that it seems most likely that they would have passed over into this group, if they had been allowed more time. Compare Fig. 11. The 345-day kidney is precisely similar to this one.

animal. Also, the two smallest ones of Group III, although slightly larger than normal, were still comparatively small and harmless, and very likely in time would have become still smaller. These two with the seven of Group IV make a total of nine out of eighteen, or 50 per cent., which assumed a state of harmlessness to the animal. One in each group died thus giving a mortality of 11 per cent. If such results could be obtained with animals some of which were in poor condition and many of which were handled in disadvantageous surroundings, one might hope with reasonable expectation that much better results could be obtained in the human. This statement is borne out very well by Barney's statistics (see Table X).

The microscopical findings in Group IV are characteristic. The 79-, 145-, and 192-day specimens may be selected as types for this description. They all show numerous glomeruli, especially the first two, and most of all, the first. In the 79-day kidney, numerous remains of convoluted and of a few straight tubules were found; at 145 days, no remains of any tubules; while again at 192 days, a few remnants of convoluted but no signs of straight tubules are discoverable. Round celled infiltration is slight in the first, moderate in the second and most marked in the third of these three specimens. They all exhibit a large amount of fibrosis.

The persistence of glomeruli is illustrated in the writer's clinical case in which numerous well-preserved glomeruli were found two and one-half years after the occurrence of the ureteral obstruction (for summary of writer's experiments, see p. 400).

C. OPERATIVE INJURY OF THE URETER IN THE HUMAN.

I. *Frequency.*—The danger of unintentional ligation or of other accidental injury to the ureter during operations in the pelvis is well known by all experienced surgeons and especially by gynecologists. The first instances reported in the literature, according to Blumenfeld (1898), were those of Walther-Simon, Nussbaum, and Hegar, but no dates are given. Blumenfeld described cases of ureteral injury and their treatment which had occurred in the practices of Gusserow, Tauffer, Martin, Dorff, Kelly, Wertheim, Rein, Bardenheuer, Bovée, Müller, Pawlik, and Veit. The following also are referred to as having met with this accident: Emmet, Cushing, Jervine, Leopold, Fritsch, Poggi, Monari, Durante, Novaro, Bovari, and Bastianelli. All of the instances cited by Blumenfeld occurred during operations by the abdominal route.

Noble has related two cases of accidental ureteral injury occurring in his experience and has analyzed thirty instances of ureteral anastomosis collected by him, in each of which lies the implication that the anastomosis was necessary on account of previous operative injury.

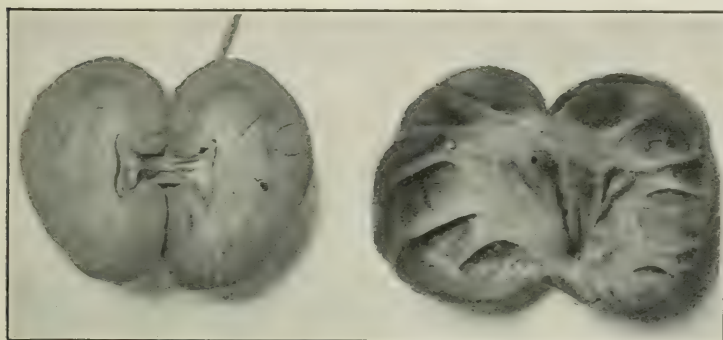
Fritsch has collected 200 instances of ureteral fistulæ nearly all of which were caused by accidental injury.

Althen described thirty-five cases of ureterovaginal fistulæ, the majority of which he ascribed to severe obstetrical deliveries or to pelvic operations.

Other instances of unintentional injuries of the ureter have been reported by Hayd, Saenger, McMonagle, Jessett, Keith, McPhatter,

Macnaughton-Jones, Landau, Doyen, Kufferath, Wells, Winslow, Miller, Cullen, Dunning, Schauta, Schopf, Markoe and Wood, Allen and Briggs, Poroschin, Ott, Warneck, Funke, Lotheissen, Krug, Baldy, Schwartz, Penrose, and Graupner. The last five are cited by Lotheissen in an article on ureteral transplantation, which includes eighty references, many of which include descriptions of injured ureters. Kruger, Wertheim, Lavisé, and Rumpf have referred to injured ureters in reports in which they did not make clear whether the injuries were accidental.

To quote details concerning all of these cases would, of course, be unwarranted in this connection; but the names of the writers are



R

L

FIG. 11.—Interior of kidneys shown in Fig. 10. Observe the sacculations on the ligatured side (L). Compare the immense dilatation exhibited in Fig. 12, R. The 345-day kidney is precisely similar to this one.

enumerated merely to impress upon the reader the size and the importance of this subject. In the light of these references, one can appreciate the statement of Cullen that “most operators of large experience have at some time ligated the ureter.” Tracy observes also that “we all know how easy it is to ligate a ureter when doing a vaginal hysterectomy.” Peiser speaks of the increase in the number of ureterovaginal fistulæ (one of the most frequent results of accidental ligation of the ureter) accompanying the development of gynecologic surgery. Noble refers to the likelihood of this accident especially in removing intraligamentous cysts.

However, those who have not given special attention to this subject or who have had no serious results following an unknown ligation of a ureter are very likely not to realize the imminence of the danger nor even the possibility of its occurrence even when all ordinary precautions have been observed. Robinson in common with Cullen

and others believes that a goodly number of gynecologic fatalities are due to the "added straw" of an unsuspected ligation of a ureter augmenting the load of an already heavy operation. Macnaughton-Jones considers that the possibility of ureteral injury constitutes one of the two chief dangers of hysterectomy, the other one being hemorrhage.

The statistics arranged in Table VIII, give an idea of the recorded frequency of *known* cases of ureteral injuries, especially ligation or other obstruction. The occurrence of this accident is not frequent, according to reported cases; but it must be remembered that a great many verified cases that end fatally or are otherwise likely to reflect upon the skill of the operator probably never are reported. Furthermore, according to Barney's statistics (Table IX), 21 per cent. of ureteral ligations never give rise to any symptoms whatever either immediate or remote. There is also another group of unchronicled cases, no doubt, where symptoms appear resulting from ureteral obstruction, but are attributed to other causes. Still other instances

TABLE VIII.—PERCENTAGE OF URETERAL INJURIES.

Operator or writer	Vaginal		Abdominal	
	Operations	Injuries	Operations	Injuries
Landau.....	573	8	700	0
Burckle.....	227	4	.....	.....
Martin.....	300	2	2000	3
Wells.....	.....	.....	94	8
Slawjansky.....	.....	.....	500	2
Partial totals.....	1100	14 = 1.3 per cent.	3294	13 = 0.4 per cent.
Robinson.....	.....	3.0* per cent.	.....	3.0* per cent.
Final averages.....	.....	2.1 per cent.	.....	1.7 per cent.

* Results given in percentage only.

never are reported merely because the operator does not take the trouble to do so. For these various reasons, the opinion is practically unanimous among those who have had the best experience in pelvic surgery that this accident occurs much more frequently than most surgeons realize. For example, Markoe and Wood say that "no doubt the ureter is ligated far more frequently than is supposed." In the light of these considerations, it seems necessary to double or triple the average occurrence given in Table VIII in order to make it more nearly accurate.

II. *Etiology of Ureteral Injuries.*—The pathological conditions in which operative injury to the ureter is most likely to occur are as follows, named approximately in the order of their frequency:

1. Carcinoma of the uterus.
2. Myoma of the uterus.
3. Ovarian cysts or other tumors, especially if intraligamentous.
4. Inflammations of the adnexæ.
5. Congenital abnormalities.
6. Extrauterine pregnancy.
7. Tumors of the bladder.
8. Severe instrumental deliveries.
9. Miscellaneous.

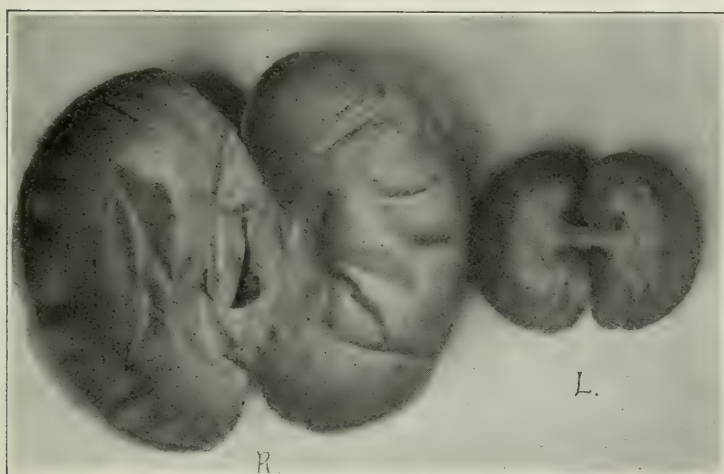


FIG. 12.—Kidneys, 270 days after ligation of the right ureter at the renal pelvis. *R.*, right kidney. *L.*, left kidney. Observe the extreme dilatation of the right one, which was filled with thin dark-colored pus. This is the largest renal distention that developed in any of the writer's animals. It is 11.3 times the size of the one on the opposite side. Compare the small size of the kidney shown in Fig. 11, *L.*

Uterine carcinoma, according to the majority of writers, is the most common cause of both operative and nonoperative obstruction of the ureter. A summary of Table IX, however, made from miscellaneous notes, taken from the literature by the writer, is at variance with this statement. This table shows that out of a total of seventy-one ureteral injuries by forty-seven operators, the pathology in twenty-two was ovarian tumor; in fourteen, uterine fibroid;

in only eleven, uterine carcinoma; in twenty-four, miscellaneous conditions; in ten, the nature of the pathology was not stated. Note the large number of cases (14) in which the pathology was other than ovarian or uterine tumor. As to the route by which the injury occurred in these seventy-one instances, forty-three were surely abdominal, while only fifteen were vaginal; in eight, the route is not

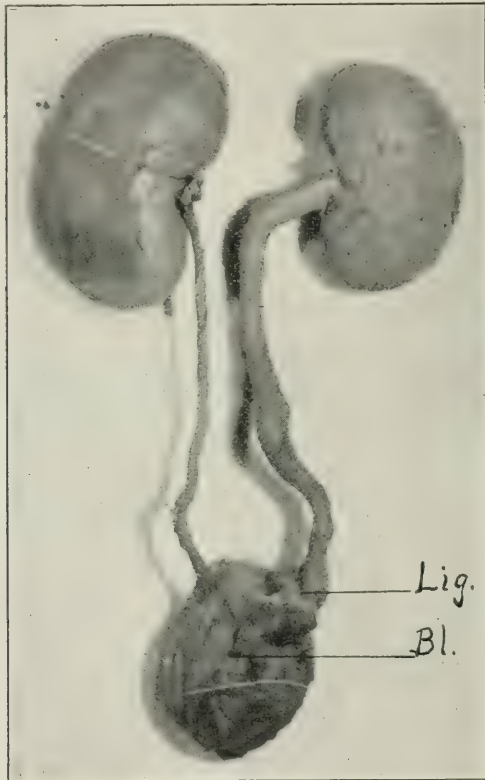


FIG. 13.—Kidneys, ureters and bladder, seventy-nine days after ligation of left ureter. *Bl.*, urinary bladder. *Lig.*, point of ligation. Note the moderate decrease in size of the left kidney as compared with the right one. Observe also the marked persisting dilatation of the ligatured ureter. Compare Fig. 14.

stated; in one, the combined method was used. The only apparent feature which vitiates these conclusions is the fact that a large proportion of these names (the first fifteen) are taken from an article by Blumenfeld in which he considers abdominal operations only. So in regard to the danger of the vaginal as compared with the abdominal mode of access, the findings in Table VIII are no

doubt more nearly correct; according to this, ureteral injuries are from 25 to 300 per cent. more frequent per vaginam than by the upper route. The reason for this, of course, is the greater accessibility of the ureter through the abdomen.

In many if not most surgical injuries of the ureter, the accident occurs, not because of the operator's ignorance of normal pelvic anatomy but on account of the abnormal proximity of the ureter

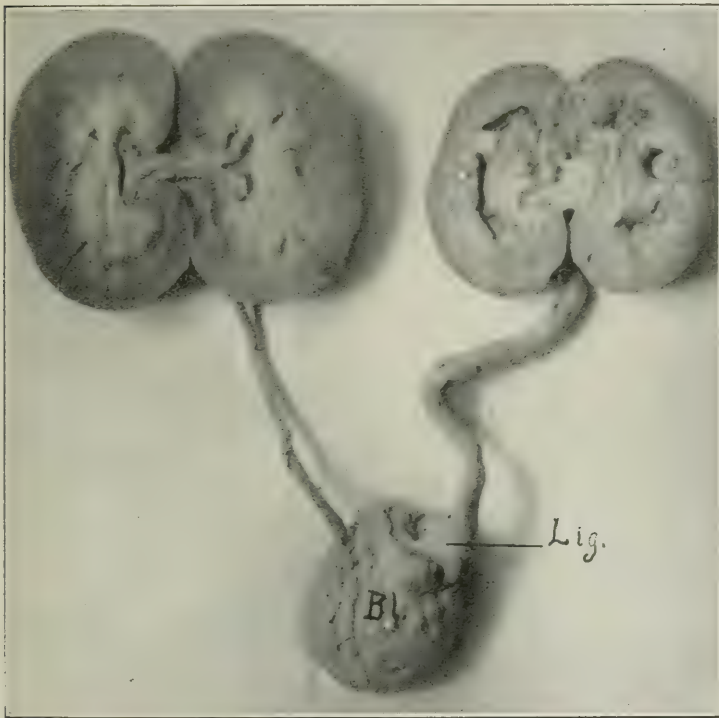


FIG. 14.—Interior of kidneys shown in Fig. 13. Note that the kidney on the ligatured side is not cystic.

to the organ involved—in other words, on account of his neglect of the pathology of the situation. In cervical carcinoma, the tumor by its mere increase in size lessens the distance between itself and the ureters, frequently coming in contact with and sometimes surrounding these ducts; only rarely, however, is the wall itself of the ureter infiltrated by carcinoma. Yet in some instances, it is practically impossible to dissect the growth away from the ureter, and hence more or less of the latter must be resected.

TABLE IX.—MISCELLANEOUS OPERATIVE INJURIES OF THE URETER.

Operator or writer	Tumor	Ovary	Myoma	Uterus	Carcinoma	Uterus	Other pathology, etc.	Route				
								Vaginal	Abdominal	Recovery	Death	No. cases
Walther.....							Hysterectomy. Pathology not stated. I	1	1	?	1	
Nusbaum.....	1							1	1	?	1	
Hegar.....	1							1	1	?	1	
Gusserow.....	2							2	2	2	2	
Taufer.....	2							2	2	2	2	
Martin.....	1							1	1	1	1	
Dorff.....	1							1	1	1	1	
Kelly.....	3	1					Tumor of bladder.	1	4	?	5	
Wertheim.....	1	1						1	1	?	2	
Rein.....	1							1	1	1	1	
Bardenheuer.....							"Radical operation" for adnexal disease.	1	1	?	1	
Bowée.....							Ovarian abscess.	1	1	1	1	
Müller.....							Intraligamentous tumor.	1	1	1	1	
Pawlik.....	1							1	1	1	1	
Veit.....							Double pyosalpinx.	1	1	1	1	
Markoe and Wood.....							Panhysterectomy. Pathology not stated.	1	?	1	1	
Schopf.....	1							1	?	1	1	
Funke.....			2					2	2	1	2	
Poroschin.....	1							1	?	?	1	
Ott.....	1							1	?	1	1	
Warneck.....	1							1	?	1	1	
Allen and Briggs.....							Horseshoe kidney.	1	1	1	1	

TABLE IX.—(Continued.)

Operator or writer	Tumor Ovary	Myoma Uterus	Carcinoma Uterus	Other pathology, etc.	Route		Recovery	Death	No. cases
					Vaginal	Abdominal			
Schauta.....				Extrauterine pregnancy.	...	I	I	...	I
Dunning.....				Abscess of broad ligament.	...	I	I	...	I
Miller.....				Pathology not stated.	?		I	...	I
Winslow.....		2				2	2	...	2
Noble.....	I	I				2	2	...	2
Purcell.....			I			I	I	...	I
Keith.....	I					I	...	I	I
Martin.....		I		Pathology of abdominal cases not given. Tumor of bladder.	2 3 I	3	2	3	5
Landau.....		5	I	Inflamed appendages.	8	...	8	...	8
Cullen.....			I			I	...	I	I
Saenger.....			I	Ureteral fistula formed.	I	...	?		I
Füth.....		I				I	I	...	I
Phenomenow.....				Tumor of uterus.	I	...	I	...	I
Bastianelli.....	I					I	I	...	I
Wasiljew.....				Mesenteric cyst.	I	...	I	...	I
Hayd.....				Uterine prolapse.	I	I	...	I	...
Krüger.....	I					I	I	...	I
Lavish.....			I			I	?		I
Rumpf.....			I			?	I	...	I
Kufferath.....				Pathology not stated.	...	I	?		I
Doyen.....			I	Fistula eighth day.	I	...	?		I

TABLE IX.—(Concluded.)

Operator or writer	Tumor Ovary	Myoma Uterus	Carcinoma Uterus	Other pathology, etc.	Route				No. cases
					Vaginal	Abdominal	Recovery	Death	
Fraenkel.....	1			Retroperitoneal fistula.	?		1	1	
Polk.....			1			1	1		1
Johnson.....			1	Ureteral anastomosis; fistula; nephrectomy.		1	1		1
Werder.....				Pathology not stated. Fistulae formed in all.		2 Com- bined 1		?	3
Danforth.....	1					1	1		1
Totals.....	22	14	11	Other pathology. Pathology not stated.	14 10 — 24	15 8 = ? 1 = Com- bined.	43	35 13 = ?	15 71

Ureteral Displacement.—The following cases illustrate how the ureter may be pushed out of its normal location and be intimately involved in the lesion: Keith describes an operation seen by himself in which a considerable portion of the ureter was found on the surface of an ovarian cyst after completion of the operation. The pathologist said that it was not ureter, but the postmortem showed that it was ureter.

Macphatter came near cutting a ureter lying on an ovarian cyst and would have done so except for the warning of an assistant. After removal of the growth, the ureter as it fell back into the pelvis coiled upon itself somewhat, because of the elongation which had been produced by the pressure of the cyst.

Kufferath tells of a laparotomy performed by himself for uterine fibroid in which the ureter was located 10 cm. from the neck of the uterus. He does not state whether this abnormal position was a congenital abnormality or was due to the tumor.

Markoe and Wood describe a case of panhysterectomy done by one of them in which 1 1/2 inches of ureter were removed with a tumor, with the supposition that the structure resected was a vein.

Its high position together with the fact that it "seemed to enter the tumor" led to the conclusion that it could not be the ureter. However, subsequent examination of the specimen revealed the true

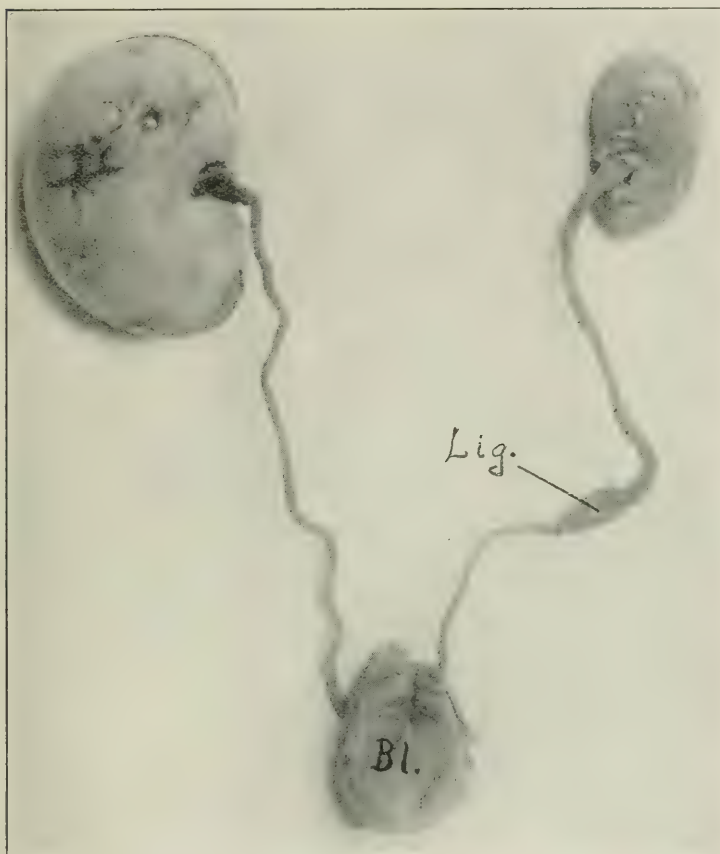


FIG. 15.—Kidneys, ureter and bladder, 120 days after ligation of right ureter. *Bl.*, urinary bladder. *Lig.*, ligature surrounded by mass of connective tissue. Note the very marked general atrophy of the right kidney. Observe also how slight is the ureteral dilatation above the ligature. Compare Fig. 16. Hildebrand and Haga illustrate a pair of kidneys very similar to these in every manner, except that in their dog the ureter was very much dilated above the obstruction, which was produced by angulation during a period of about 330 days. A 330-day ligation done by Tait resulted in a still more marked renal atrophy.

nature of the accident. On reopening the abdomen, the other ureter was found to be completely occluded from kinking "by the closure of the peritoneal flaps but *not included within the ligature.*" Recovery

followed the straightening of this angulation and the doing of a ureteroureteral anastomosis on the other side.

Purcell has reported a similar case in which the obstruction was due to kinking caused by a ligature in adjacent tissues.

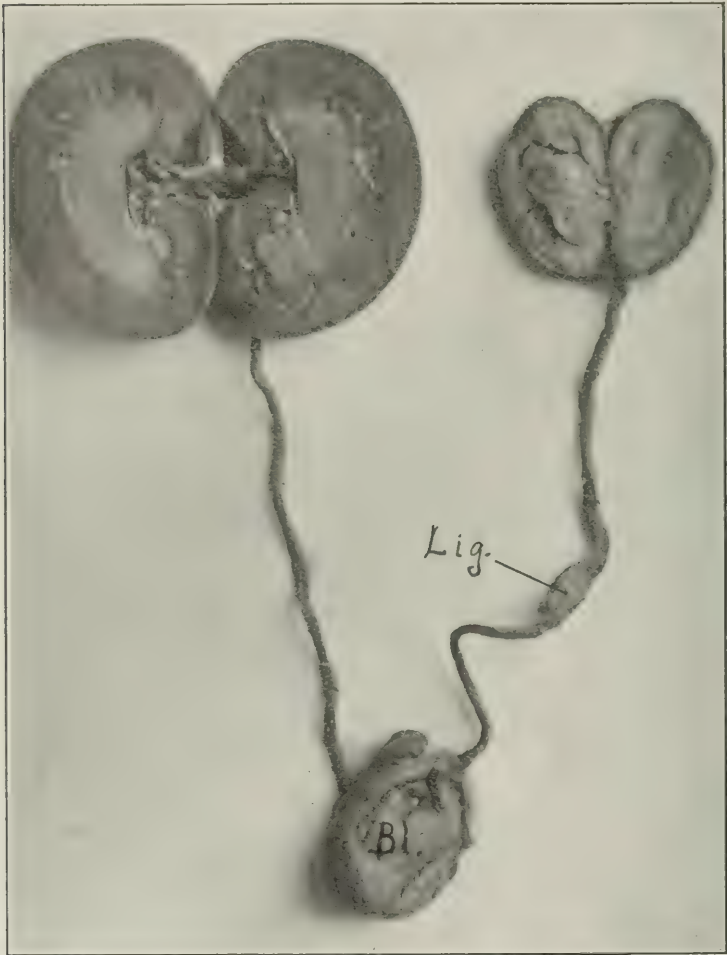


FIG. 16.—Interior of kidneys shown in Fig. 15. Note that the kidney on the ligatured side is not cystic. This is a case of probable primary atrophy.

Dunning has described an instance in which he severed a ureter because it ran "over the superior surface of the wall of a broad ligament abscess."

Noble says that the ureter may rarely lie "between adjacent fibroid tumors."

Ureteral Inclusion.—The following cases illustrate how the ureter may be involved within pathological growths without marked displacement. Polk tells of an instance in which the wall of the ureter was involved for about half an inch by a uterine carcinoma, which necessitated resection of about an inch of the ureter. This is not a rare case, but only one illustration of a rather large group. Johnson and others having reported similar instances.

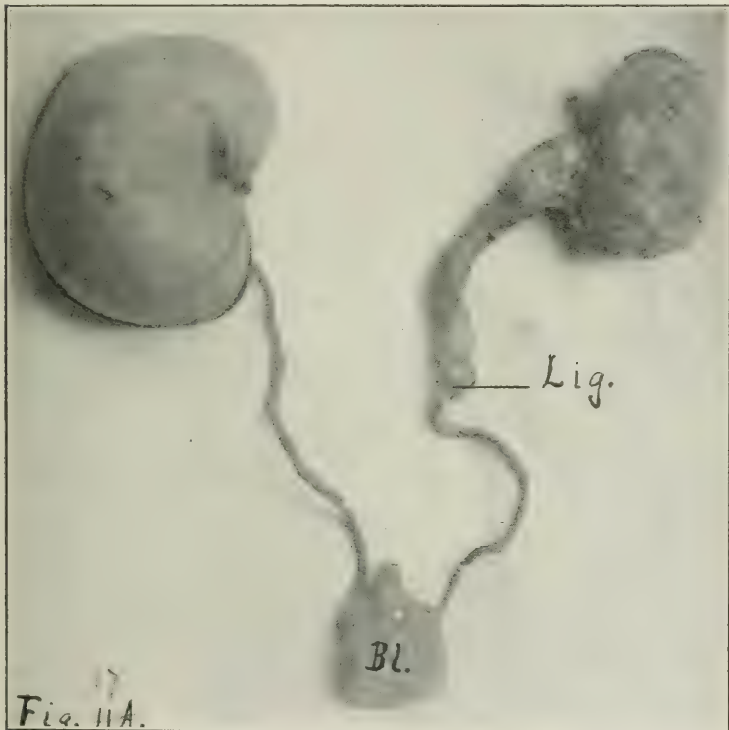


FIG. 17.—Kidneys, ureter and bladder, 145 days after ligation of the right ureter. *Bl.*, urinary bladder. *Lig.*, location of ligature. Note the marked general atrophy of the kidney on the ligatured side, in degree about midway between those shown in Figs. 13 and 15. Compare Fig. 18.

Ruhl and Crobak report two cases "in which the ureter passed directly through a portion of a uterine fibromyoma, and had to be freed from the growth for a distance of 7 cm. in one instance and 9 cm. in another."

Wertheim describes two cases of involvement of the ureter by

tumors, one an ovarian sarcoma and the other a tumor of the bladder; in each instance it was necessary to resect deliberately a considerable portion of the ureter.

Congenital Abnormalities.—These are said by some to lead to accidental injury. However, there seems to be few if any such instances cited in the literature.

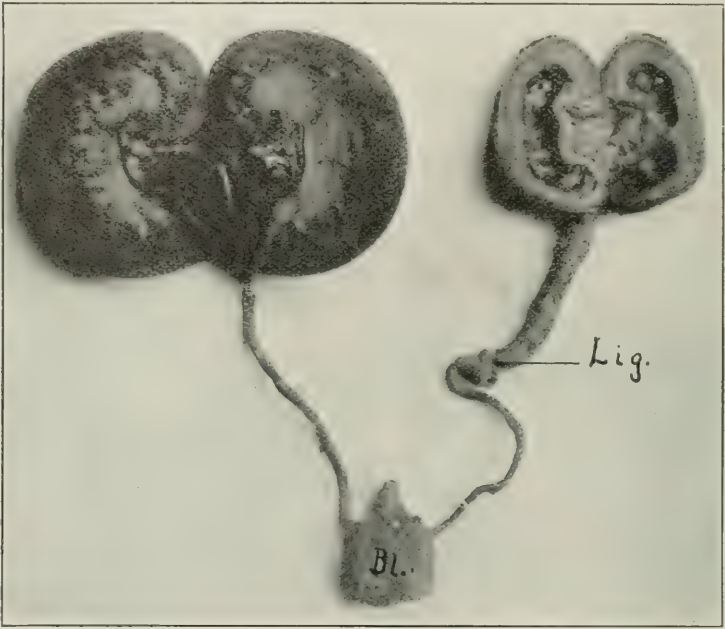


FIG. 18.—Interior of kidneys shown in Fig. 17. Note that the kidney on the ligatured side is rather cystic. Beer illustrates a pair of kidneys very similar to these in every way and produced by a complete ureteral obstruction of about ninety days' duration. Scott, the same; but the occlusion in his dog was incomplete and lasted 163 days.

In the light of the great variety of pathological conditions described above it is quite evident that each case must be worked out by itself as an independent problem in pathological anatomy.

In summarizing the causes of operative injuries to the ureter, I would say that the most important points are, first, intimate pathological involvement by pelvic tumors and second, lack of care on the part of the operator; less frequently lack of anatomical knowledge or the presence of congenital abnormalities may give rise to trouble.

III. *Pathology of Ureteral Injuries.*—The following are the various kinds of accidental injuries of the ureter which occur during operation:

TABLE X.—CLINICAL CASES OF COMPLETE OPERATIVE OBSTRUCTION OF THE URETER.

Operator or author	Intentional	Accidental	Pathology, etc.	Results	Remarks
Fraenkel.....	I	.....	Intraligamentous cyst. Age patient, 51.	Death, eighth day. Ureteral fistula and retroperitoneal infiltration of urine found at autopsy.	
Miller.....	.....	I	Gynecological. (More details not given.)	Symptoms of urinary obstruction relieved by passing ureteral catheter.	Tied during operation, but ligature removed before closure of abdomen. Importance of cystoscope.
Cullen.....	.....	I	Uterine carcinoma. Abdominal route.	Death. "As might have been expected, hydronephrosis on the right [ligatured] side."	Time of death after operation not stated.
Fath.....	I	.....	Uterine myoma. Abdominal route.	None after 7 1/2 months.	Long section of ureter removed accidentally with myoma.
Phenomenon.....	I	.....	Tumor of uterus.	None after 7 weeks.	
Bastianelli.....	I	.....	Sarcoma right ovary involving fundus of uterus.	No symptoms. "Complete atrophy probably followed."	
Landau.....	I	.....	Uterine carcinoma. Abdominal hysterectomy.	For 3 days, vomiting and headache. For 3 weeks, urine one-half normal amount. At end of 7 months, no symptoms of hydronephrosis, and cystoscope showed functionless kidney on side of ligature.	Five centimeters of ureter were removed. Ligation done with intention of subsequent nephrectomy, which proved to be unnecessary.
Wassiljew.....	.....	8	One carcinoma uteri, 5 myoma uteri, 2 inflamed appendages.	In 6, ultimate nephrectomy was necessary, all apparently on account of incurable fistulae. One fistula case closed spontaneously and 1 was cured by operation. No mortality.	The implication in Landau's description is that these 8 injuries were all obstructions by ligation.
Pollosson.....	I	.....	Uterine myoma and cysts broad ligament. Abdominal operation. Ligatured renal end of cut ureter, <i>en masse</i> with connective tissue.	Practically no symptoms. Observed for 6 years. Never performed nephrectomy which he expected would be necessary.	Emergency operation to end operation. Could not isolate renal end of severed ureter. Therefore ligated <i>en masse</i> .
Barbianelli*	I	.....		
Gayet.....	I	.....		

Cited by Albarran (*loc. cit.*). No details given and the original references cannot be found.

TABLE X.—CLINICAL CASES OF COMPLETE OBSTRUCTION OF THE URETER.—(Continued.)

Operator or author	Intentional	Accidental	Pathology, etc.	Results	Remarks
Cited by Frank and Baldauf.	7	.....	Done in "one of the large surgical clinics of this country." In a personal communication to the writer, Dr. Frank states that he is not at liberty to name the clinic, but that he is sure the cases are authentic. Results not stated.		
Collected by Barney	62.	A few intentional; most accidental.	"Large majority hysterectomy; vaginal or abdominal."	<i>Bilateral.</i> Anuria in all. One recovery after 72 hours. Mortality, 33 per cent. <i>Unilateral.</i> Anuria, 1.6 per cent.; ureteral fistula, 24 per cent.; serious infection of kidney, 15 per cent.; hydronephrosis, 80 per cent. of 15 cases investigated; other 20 per cent., "no change." <i>No symptoms at all immediate or remote</i> , 21 per cent. Ureteral fistula, 24 per cent.; mortality, 18 per cent. Average mortality (bilateral and unilateral), 25 per cent.	Details of individual cases not given. Unilateral, 46; bilateral, 16. Some obstructions produced by clamps, but most by ligature.
Hayd.....	.....	I	Vaginal hysterectomy for uterine prolapse.	Uretero-vaginal fistula on 17th day. Nephrectomy on 57th day. Complete recovery. Hydronephrosis marked (thickness of cortex, 1/4 inch).	Operation was not technically difficult.
Purcell.....	.....	I	Uterine carcinoma. Abdominal route. Bilateral.	Complete anuria. Removal of ligatures after 58 hours. Complete recovery.	Ureters were not actually tied but <i>kinked</i> by pulling off the ligatures. Purcell says he has "more than once seen a ureter ligated after injury, "leaving the kidney to become hydronephrosed."
Martin.....	.....	5	One myoma; I tumor of bladder; 3 not stated.	One died on the 7th day from uremia; hydroureter at autopsy. One fistula; closed successfully later. <i>Recovery.</i> One died from uremia; I died from septicemia on the 6th day; I fistula; operation for this unsuccessful. Nephrectomy. <i>Recovery</i> , mortality, 80 per cent.	First two described were vaginal cases and the other three, abdominal.
Ott.....	.....	I	Not stated.....	Patient died. Cause of death not stated.	
Saenger.....	.....	I	Carcinoma uteri.....	Ureteral fistula. Further outcome not stated.	
Vander Veer.....	.....	2	One purulent salpingitis.	Within a few weeks, pain on ligatured side, chills and temperature; later, tum or; 6 years after operation, purulent kidney removed. Recovery.	
			One hysterectomy.	Fistula formed, which healed spontaneously in a few weeks.	

TABLE X.—CLINICAL CASES OF COMPLETE OPERATIVE OBSTRUCTION OF THE URETER.—(Concluded.)

Operator or author	Intentional	Accidental	Pathology, etc.	Results	Remarks
Veit.....	.....	I	Intraligamentous ovarian tumor.	Recovery. Probable atrophy of kidney.	About 7 cm. ureter found attached to tumor after operation and identified microscopically.
Olshausen.....	I	.....	Intraligamentous ovarian tumor. Abdominal hysterectomy.	Proximal end of ureter tied with catgut, which was absorbed allowing retroperitoneal infiltration of urine. Nephrectomy. Recovery.	Not ascertained whether patient recovered or died.
Ortmann	I	.....	Hydronephrosis. Anomalous ureter emptied into vagina.	Recovery.	
Bardenheuer.....	I	.....	Carcinoma cervix. Hysterectomy.	Immediate recovery. Death in 8 weeks caused by renal infection.	
Summary.....	10 + 22 + 62 (Barney) = 99.		Too miscellaneous for pertinent summary.	Intentional obstruction = 11 per cent. mortality in 9 cases in which results stated. Accidental obstruction = 20 per cent. mortality in 21 cases in which results given.	

* Suspected error; may be Bastianelli.

1. Ligation.
2. Clamping.
3. Kinking.
 - a. By ligature.
 - b. By clamp.
4. Incision.
 - a. Partial.
 - b. Complete.
5. Resection of portion of ureter.
6. Destruction of blood supply, leading to necrosis.

The above points are stated approximately in the order of the frequency of their occurrence, the most common accident of all being complete obstruction; probably 80 or 90 per cent. are of this character. The occlusion may be complete or incomplete, the latter being very rare; and ligation is far more frequent than clamping or kinking. Our interest centers around complete obstruction also because of the bearing our experimental work has upon it. The results of complete closure of one ureter named as nearly as possible in the order of their seriousness to the patient are as follows:

Local	{	<ol style="list-style-type: none"> 1. Infection. 2. Fistula. 3. Hydronephrosis. 4. Atrophy. 	General	{	<ol style="list-style-type: none"> 5. Toxemia. 6. Anuria. 7. No symptoms.
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Barney's statistics (Table X) give us the most reliable information obtainable in regard to the probability of the occurrence of these sequelæ. More than 95 per cent. of all the hazards are included under the first three points mentioned above. It is noticeable also that infection, the most serious of these three, has the lowest percentage of occurrence, namely 15. Guyon found in twenty-four nephrectomies only one in which the fluid in the kidney was aseptic. These findings he uses as an argument against intentional ureteral ligation as a method of handling injuries of this duct. There are two fallacies in this reasoning: first, a low-grade infection does not necessarily cause any trouble; second, his operations were done upon supposedly diseased kidneys, while most accidental ureteral injuries in which one would do a voluntary permanent occlusion happen in patients with comparatively normal kidneys, the pathological lesion requiring the operation usually being in the pelvis.

Returning to Barney's statistics, we find that fistula, the next most serious outcome, is found in 24 per cent., while hydronephrosis,

the least ominous of the three, occurred in 80 per cent. of the fifteen cases from which information was obtained concerning this point. He does not mention any known case of atrophy. Toxemia seems to be an almost imaginary danger, and anuria occurred only once in

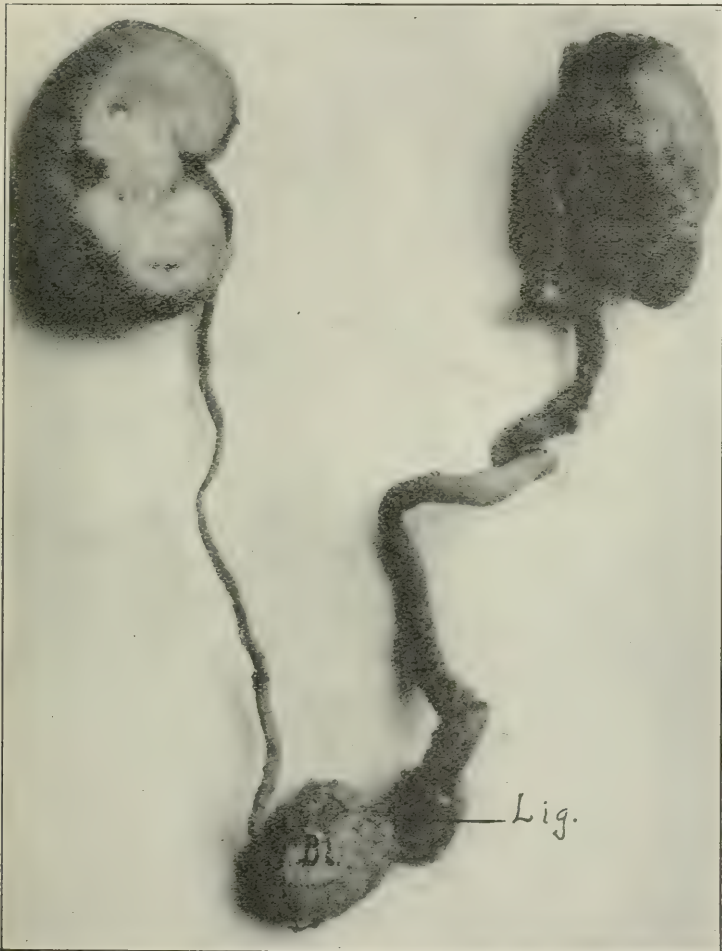


FIG. 19.—Kidneys, ureters and bladder, 186 days after ligation of left ureter. *Bl.*, urinary bladder. *Lig.*, location of ligature. Note the distention of the ureter and the moderate general atrophy of the kidney on the ligatured side. Compare Fig. 20.

forty-six cases. In 21 per cent., there were no symptoms at all, either early or late. The total mortality from all causes was 18 per cent.

The writer has met with at least one case of probable ureteral ligation by accident, in his clinical experience. This patient had undergone a hysterectomy for uterine fibroid, and had remained well thereafter for about two years. Then she began to have in her right side some pain, which was gradual in its development, being at first

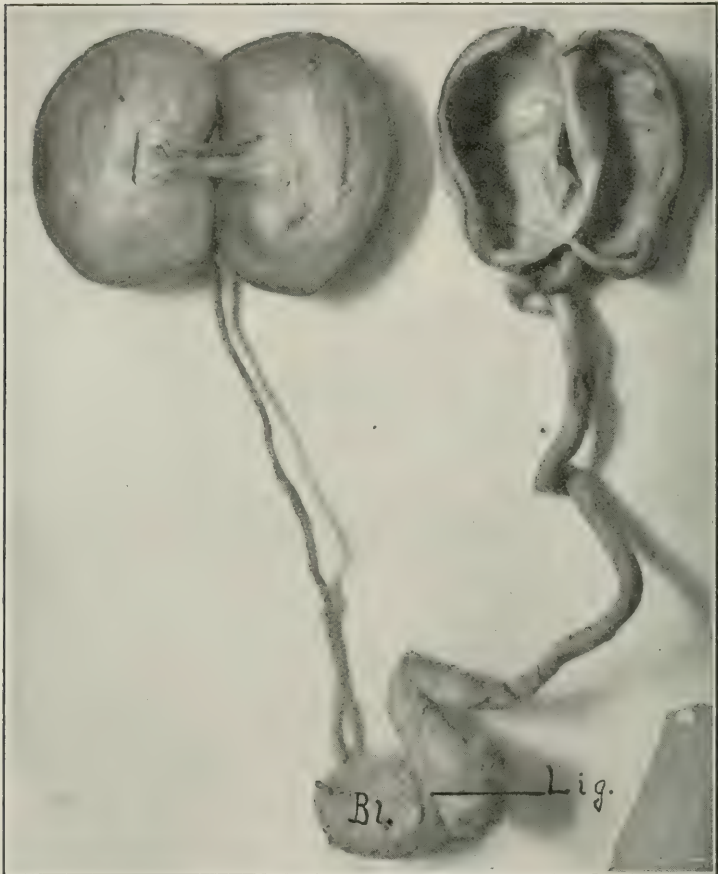


FIG. 20.—Interior of kidneys shown in Fig. 19. The kidney on the ligatured side is the most cystic of any of the seven in the writer's general-atrophy series.

mild and intermittent and later severe and nearly continuous; it was located mostly just at the left of the right anterior superior iliac spine and showed but little tendency to radiate. She suffered somewhat from increased frequency of urination. There were no temperature, no chills, nor any other signs of infection. In a few months a tumor

mass became palpable, which finally, two and a half years after her hysterectomy and six months after the beginning of this latter group of symptoms, had grown sufficiently to be distinctly noted by inspec-

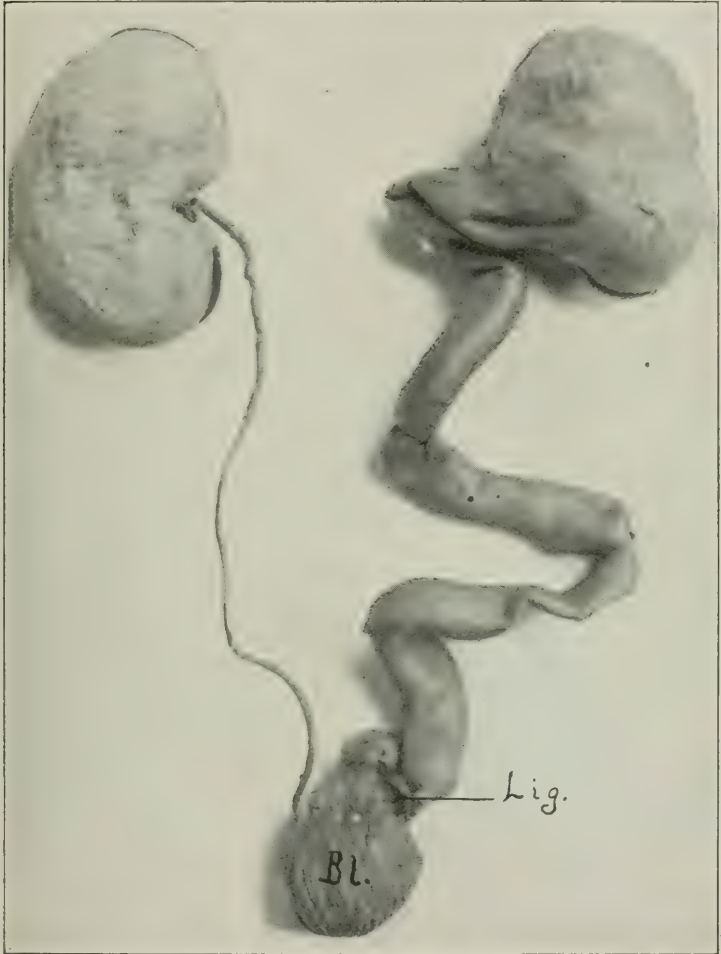


FIG. 21.—Kidneys, ureters and bladder, 102 days after ligation of left ureter. *Bl.*, urinary bladder. *Lig.*, location of ligature. Note the enormous dilatation of the ureter and the slight decrease in size of the kidney on the ligatured side. Compare Fig. 22. Hildebrand and Haga illustrate a pair of kidneys very similar to these, in which the obstruction was produced by ureteral angulation and lasted 166 days; but they do not describe the interior of the kidneys of this dog.

tion alone, being raised at its most prominent point about one inch above the surface of the rest of the abdomen. It appeared to lie in

the right lower lumbar and upper iliac region. The tumor was judged before operation to be about six inches in diameter and cystic in character.

At this juncture I operated upon her and removed with great difficulty a very large multilocular cystic kidney universally adherent and filled with pus. The patient's condition would not permit of exploration to ascertain the condition of the ureter and the

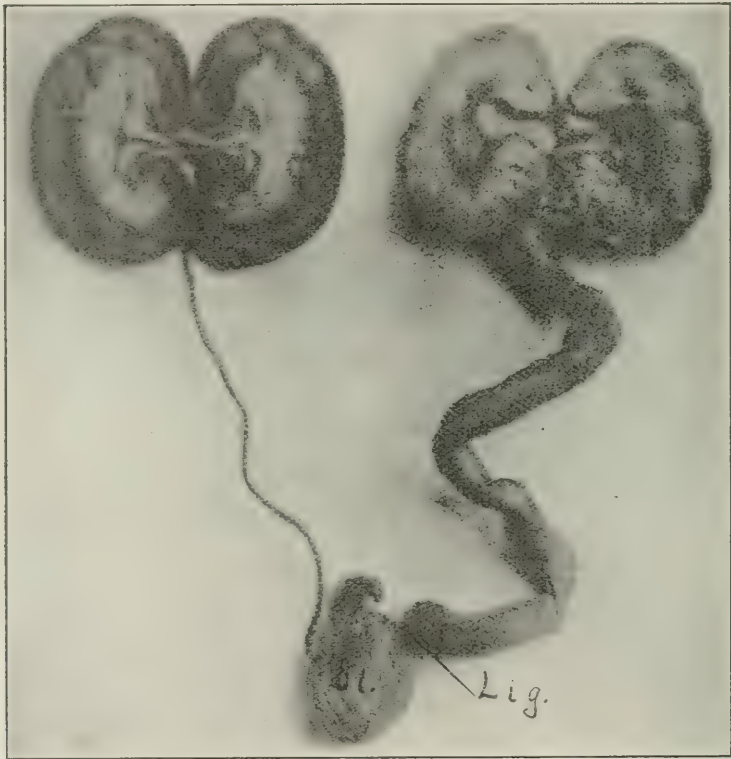


FIG. 22.—Interior of kidneys shown in Fig. 21. Note the small degree of hydronephrosis on the ligatured side. Barney illustrates a pair of kidneys rather similar to these; one ureter had been ligated for 112 days.

cause of its obstruction. However, when one considers the data given in Tables VIII, IX, and X, the probability amounts almost to a certainty that this cystopyonephrosis was due to a ureteral obstruction (probably ligation) produced during her hysterectomy. The fact that no symptoms arose during two years does not militate against this probability when we take into consideration the well-known fact that cystic lesions, such as hydronephrotic kidneys and

ovarian cysts, may exist for many years without causing trouble, and then finally suffer such changes as infection, etc.

A special discussion of symptoms and diagnosis of operative ureteral obstruction is beyond the scope of this paper. However, the

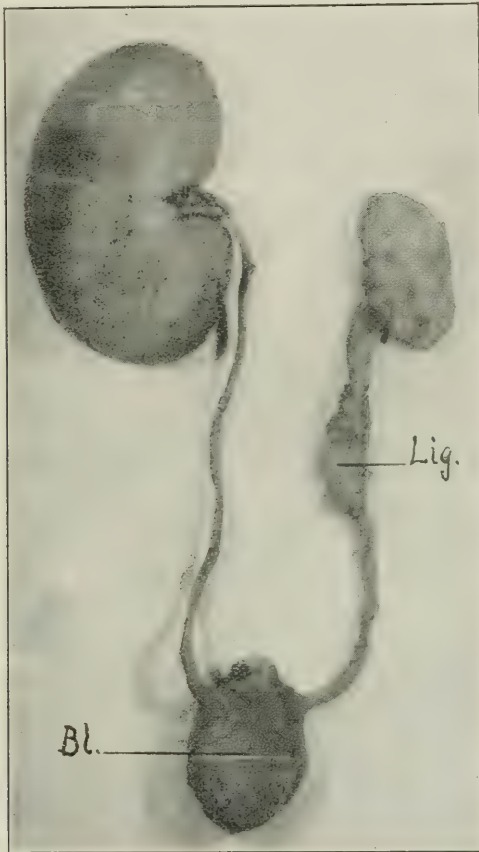


FIG. 23.—Kidneys, ureters and bladder, 210 days after ligation of left ureter. *Lig.*, mass of connective tissue surrounding ligature. Note the extreme general atrophy of the kidney on the ligatured side and the dilatation of the ureter above the ligature. Compare Fig. 24. Hildebrand and Haga illustrate a pair of kidneys very similar to these in every regard, in which the atrophy was produced by angulation of the ureter for a period of about 330 days. Likewise, Tait; but he found the atrophy after 330 days to be still more marked, and the obstruction in his dog was produced by ligation.

importance of the cystoscope, if there is a suspicion that this accident has occurred, should never be forgotten. In most cases, the ureteral catheter will clear up the diagnosis. An x-ray taken after

injection of the portion of the ureter below the obstruction, with a fluid impervious to the Röntgen ray may be of value in rare instances.

IV. *Treatment of Ureteral Injuries.*—The first consideration in this connection is prophylaxis. For this purpose “exact anatomical

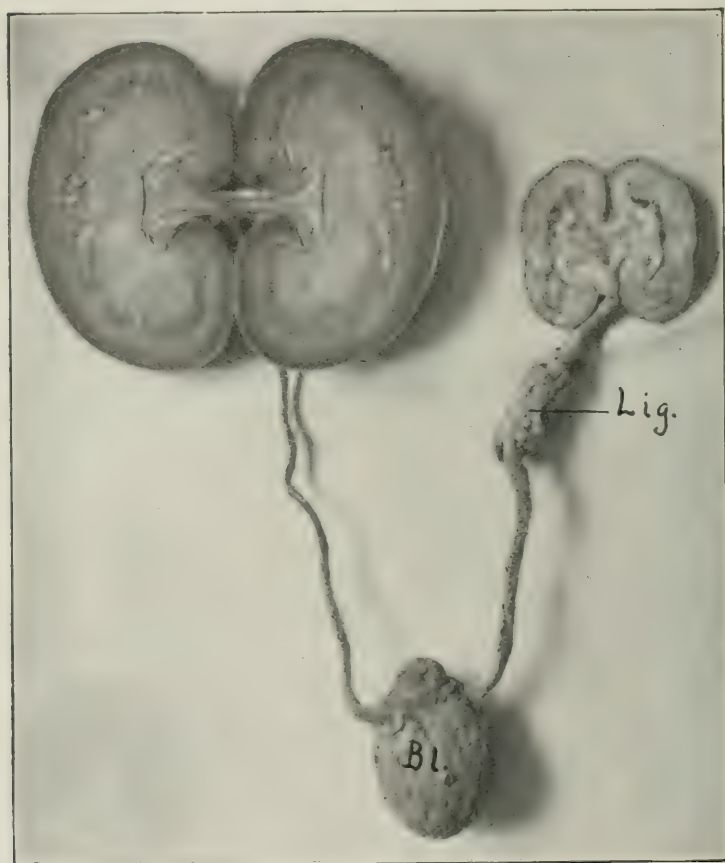


FIG. 24.—Interior of kidneys shown in Fig. 23. Note that the kidney on the ligatured side is not cystic.

knowledge is of little avail” (Macnaughton-Jones). This is due to the great variations in the relations of the ureter caused by pathological involvement. Also its position varies considerably within normal limits and, too, congenital abnormalities sometimes are encountered. These statements are not intended as an argument against the value of a knowledge of the normal anatomy, but are

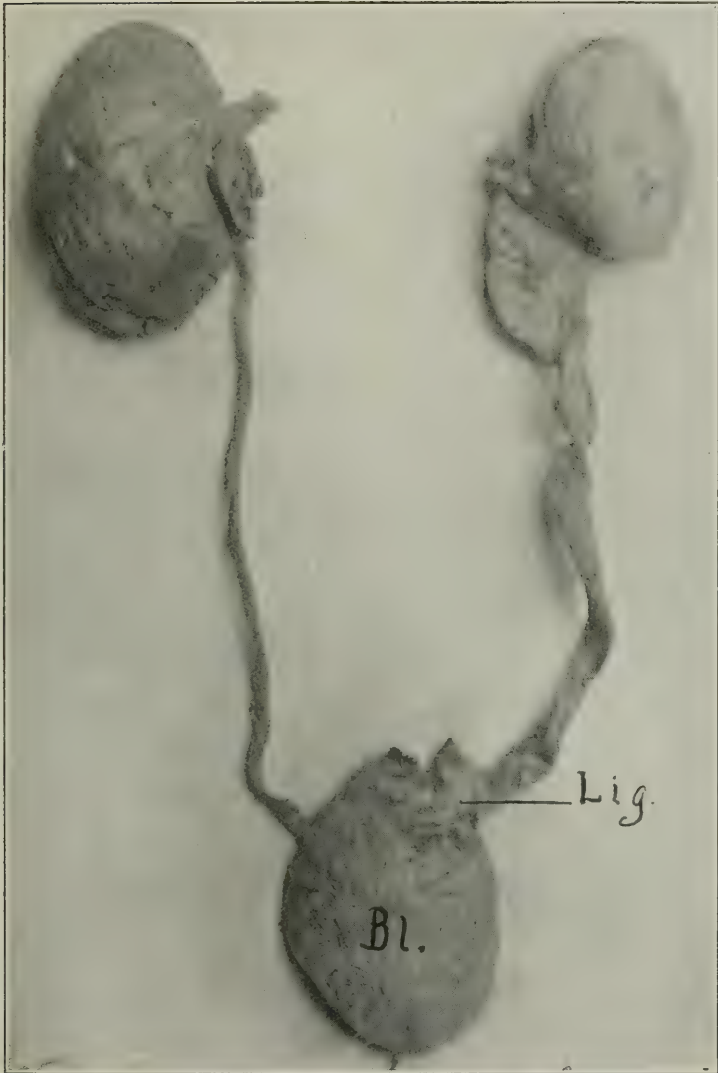


FIG. 25.—Kidneys, ureters and bladder, 256 days after ligation of left ureter. *Bl.*, urinary bladder. *Lig.*, location of ligature. Note the rather marked general atrophy of the kidney on the ligatured side and the dilatation of the ureter above the ligature. Compare Fig. 26.

made to show that dependence upon this information alone will frequently lead one into trouble.

The ureter should be found in the upper part of its course in practically every pelvic operation, and should then be traced down-

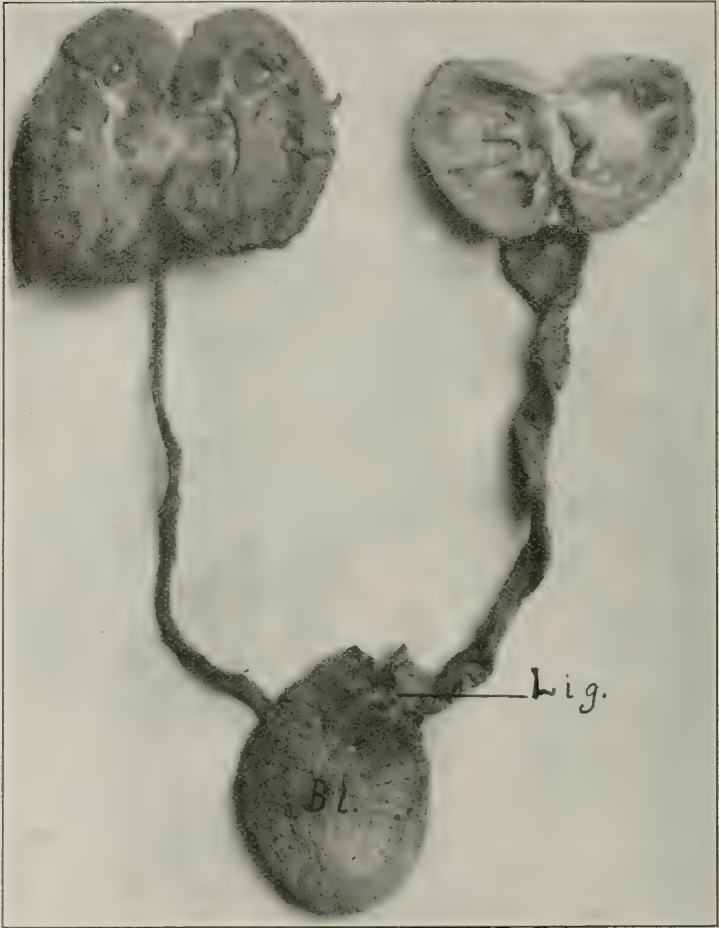


FIG. 26.—Interior of kidneys shown in Fig. 25. Note on the ligatured side the cystic condition of the kidney, which is next in degree to that shown in Fig. 20.

ward until its relations are seen or felt distinctly. Its superficial position close under the peritoneum usually allows of this recognition without difficulty. Whenever it is necessary to dissect it out, great care should be exercised not to impair its blood supply. The lament

of Wells that he could "not see how we can with certainty avoid the ureter," although founded on experience, is somewhat too pessimistic. The passage of the ureteral bougie (not known in Wells' time) will make its avoidance a practical certainty. Yet Noble says that when the ureter passes "between adjacent fibroid tumors . . . nothing but the habit of the surgeon to recognize tissues before he cuts them will protect the ureter from injury." I feel that on the whole, without the use of the ureteral bougie "with all possible care a mistake may occasionally prove unavoidable" (Wells). The more recent practice of making long incisions tends toward safety for the ureter; for with an abundance of room, one is more likely to attack first the tissues around the spot where the ureter is most likely to be endangered; thus by approaching the pathological from the normal and not directly, disentanglement of the situation is accomplished with greater safety.

Noble says that "ureter is best protected by pushing the broad ligament away from the uterus or tumor." The good advice is given also by this writer and others in ligating the uterine artery to isolate it from the surrounding tissues before tying in order to be sure to avoid the ureter. Similarly Huggins advises in ligating the ovarian vein in the treatment of puerperal thrombophlebitis that the operator dissect out this vein before passing the ligature.

Tauffer suggests that a final inspection of the ureter should be made before closure of the abdomen; if a slight distention is discovered, it is almost certain that obstruction of the ureter has been produced.

Finally and above all, one should have *the danger of ureteral injury continuously and prominently in mind*. This care alone, no doubt, would accomplish the avoidance of many if not most of these accidents. If every surgeon would realize with Macnaughton-Jones that ureteral injury together with hemorrhage constitute the "two main risks" of hysterectomy, the prophylaxis of operative ureteral injuries would be half accomplished.

If the ureter has been actually injured, the perplexing question arises as to what shall be done with it. The following are the possible dispositions:

1. Obstruction due to ligature, clamp or kink.
 - a. Removal of obstructing agent.
2. Injury caused by undue pressure, incision, resection or destruction of blood supply.
 - a. Ureteroureteral anastomosis (same side).

- b. Ureterovesical anastomosis.
- c. Implantation into intestine.
- d. Anastomosis with other ureter.
- e. Reconstruction of portion of ureter with intestine, appendix, etc.
- f. Formation of external fistula (usually followed later by nephrectomy).
- g. Intentional ligation or other permanent occlusion of ureter: (1) to be followed by secondary nephrectomy; (2) ureteral lumen to be restored by secondary operation; (3) to be left to nature trusting to atrophy or a harmless hydro-nephrosis.
- h. Primary nephrectomy.

Our interest in the first group in this connection consists chiefly in determining what results follow if the obstruction is not removed. These sequelæ have been described already in this paper both from an experimental and a clinical standpoint. Most of the injuries mentioned in Group II are handled by one of the first two methods of anastomosis or by primary nephrectomy. The discussion of the entire field of the treatment of ureteral injuries is far too large to come within the limits of this article and is not pertinent to our main theme. Hence we will consider only the following point:

Intentional Ureteral Occlusion as a Treatment of Ureteral Injuries.—Scarcely more than a quarter of a century ago, it was rather generally believed that operative obstruction of one ureter was necessarily fatal. The first change from this view was due to the discovery, during the development of gynecologic surgery, that a considerable percentage of ligations and other ureteral injuries are followed by the formation of fistulæ, usually ureterovaginal. Also, it was soon noticed that certain undoubted cases of accidental ureteral ligation were followed by no symptoms at all, either immediate or remote. This discovery was a special stimulus to more careful clinical observations and to experimental research along this line. Recently it has been shown by Barney (see Table X) in a large series of collected cases that in the human, complete ureteral obstruction both unilateral and bilateral, by operative accident has no higher mortality, all told, than 25 per cent. A large number of these fatalities was due without doubt to the fact that the obstruction was accidental. Had the operator known in each case that he had ligated a ureter, the mortality would have been much lower even without removal of the ligature in the unilateral cases, because with this

knowledge appropriate after-treatment would have saved many of those who died. In other words, the mortality of *accidental* unilateral ligation (18 per cent.) should not be taken as the necessary mortality also of *intentional* occlusion. In fact, the fortuitous observation that many accidental ligations of ureters gave rise to no trouble, finally suggested the possibility of getting rid of the kidney, at least functionally, by ligation of the ureter, especially in those instances in which the nature of the injury was irreparable.

For fifteen years or more it has been pretty well known among those of special experience in ureteral surgery, notably gynecologists, that aseptic occlusion of the ureter frequently leads to no apparent ill results either primary or secondary. According to Landau, this procedure was carried out voluntarily for the first time in 1892 by Guyon. Bastianelli reported a case in 1896; Futh, in 1898; Phenomenow and Landau each, one in 1900; Fraenkel and Olshausen each, one in 1901; Ortmann, one about 1899 (?); Bardenheuer, one about 1903(?); Wassiljew, one in 1907. Landau cites Polosson and Gayet (no dates given) each as having resorted to this procedure. In the case of Bastianelli, it was said that no symptoms resulted but no statement was made in regard to the length of time the patient was observed. Futh followed his patient for seven and one half months; Phenomenow, for seven weeks; Landau, for seven months; Wassiljew, for six years. In none of these did any symptoms arise which could be attributed to the ligation. The patients of Olshausen and Ortmann recovered; Bardenheuer's died. Concerning the cases of Guyon, Fraenkel, Polosson, and Gayet, I am unable to obtain details.

Frank and Baldauf made the statement in 1912 that in "one of the larger surgical clinics of this country . . . in seven different cases one ureter had been intentionally ligated for the purpose of getting rid of the kidney, the patients each suffering from accidental injury of the ureter and consequent fistula." In a personal communication the following year, Dr. Frank has assured the writer of the authenticity of these cases and mentions another instance in which ureteral ligation "was done with intent, and nothing further was heard from the kidney." These seventeen cases occurring during the last twenty-two years together with a few referred to by Barney without any details constitute a considerable beginning in giving this procedure a clinical trial.

Albarran has gone so far as to formulate for this operation a group of indications as follows: (1) after resection of the ureter when it is impossible to reunite the ends or to implant the upper end into the bladder (Stark, Hayd, and others); (2) as a therapeutic measure

in hydronephrosis (Ortmann) and in carcinoma of the kidney (Jaboulay); (3) in nephrostomy for diverting the urine in order to prevent it from entering the bladder (Albarran); (4) to terminate a severe operation with the purpose of dealing secondarily with the kidney or the ureter in order to save the former (Albarran, Hayd, and others). Albarran, however, does not vouch for the value of all of these indications. They seem to be based on good clinical and experimental evidence, except the second one. Of what value ureteral ligation could be in renal carcinoma it seems impossible to conceive; and as to hydronephrosis, much of our very best evidence would lead one to expect a still greater hydronephrosis if the ureter of a hydronephrotic kidney were ligated. Atrophy might occur, according to Beer, if the retained fluid could be kept aseptic. As a matter of actual practice, it is difficult to avoid infection of at least a low grade.

The possible dangers of ligation of one ureter as a method of treating injuries to this duct are the following:

- | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ol style="list-style-type: none"> 1. Primary. <ol style="list-style-type: none"> a. Shock. b. Anuria in the other kidney. | <ol style="list-style-type: none"> 2. Secondary. <ol style="list-style-type: none"> a. Infection. b. Hydronephrosis. c. Fistula. d. Renal toxemia. |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

There is no shock *per se* to this procedure. That anuria is a very remote danger may be seen by referring to Table X. Infection is the greatest hazard. As long as it remains aseptic, hydronephrosis usually causes but few symptoms; its mere size may give rise to trouble later; but if it becomes infected, radical measures must be employed to save the patient's life. Likewise, added to the discomfort of a ureterovaginal fistula is the serious likelihood that an ascending bacterial contamination of the kidney will ensue. Renal toxemia seems to be a purely theoretical danger. The one and only outcome which involves no risk is uncomplicated general atrophy.

In actual practice, one may find this procedure of value in both injuries of moderate severity and in those which are beyond repair. In the former, the occasion for making the occlusion usually is the fact that on account of the patient's unfavorable condition, time cannot be taken for repair work. In this group of cases, ligation is supposedly only temporary, the intention being to restore the ureteral lumen within a week or two at a second operation. In case the injury is irreparable, the ligation of the ureter should be done with the following plan for the future: If no serious symptoms arise,

nothing further should be done, because if a hydronephrosis has formed, it is small and inconsequential or has been succeeded by secondary atrophy. If primary atrophy occurs, the situation is permanently secure without further interference. If a hydronephrosis becomes very large or if it produces symptoms, though it is small, nephrectomy is indicated. Severe infection, of course, necessitates removal of the kidney.

It seems to the writer that intentional occlusion of the ureter has a definite and important place in the treatment of certain ureteral injuries, if carried out as suggested above, not necessarily as a final measure but as one which needs subsequent watching. Not until we are able to control infection and the formation of hydronephrosis and atrophy, will it be safe to leave the result of this procedure to itself without further observation and possible subsequent treatment. McMonagle, Cullen and others object to this measure as being "unsurgical." Frank and Baldauf consider that if restoration of the lumen of a ureter is impossible, nephrectomy is the procedure of choice. Albarran considers ureteral ligation as harmless as long as no infection arises. However, only the test of further clinical and experimental research will determine its true surgical status. My own experimental work favors this procedure; for in a considerable number of instances after complete ureteral obstruction, marked general atrophy of the kidney resulted in spite of mild infection, while in several other animals, the hydronephrosis, though of considerable size, seemed to be entirely harmless. (For summary of literature on operative injury of the ureter in the human, see p. 402.)

SUMMARY.

A. *Literature on Experimental Ureteral Obstruction.*

1. *Technic.*—The following are the two most important points: (a) The accomplishing of complete obstruction and at the same time the avoidance of ureteral fistula by not drawing the ligature too tightly or by covering the knot with omentum or other tissue. (b) Infection is the greatest difficulty. The intrarenal type is very common and seems to be hematogenic in origin and hence apparently largely unavoidable. Extrarenal infection is still more common and usually can be traced to faulty technic. The final complete solution of the problem of the results of ureteral obstruction seems to depend largely upon the control of infection.

2. Hydronephrosis *vs.* atrophy. (a) Few if any careful observations have been made as to whether the kind or the age of the animal

has any influence in determining the formation of hydronephrosis or atrophy. (b) There is very little evidence in favor of the theory that high obstruction leads more frequently to hydronephrosis and low, oftener to atrophy. (c) The longer the duration of the obstruction, the greater, as a rule, will be either the ultimate hydronephrosis or atrophy. When the latter develops it almost always is secondary to primary hydronephrosis. More hydronephroses than atrophies are reported in the literature for one reason at least, namely, that atrophy seldom supervenes before the sixtieth day and but few experimenters keep many of their animals beyond this time. (d) The less the infection the more likely and the more prompt is the development of general atrophy. Marked infections seem to preclude atrophy and to lead to the formation of large cystopyonephroses. (e) There is some evidence in favor of the idea that renal capsular anastomoses lead to the formation of hydronephrosis; but this theory is by no means established. (f) Complete, more frequently than incomplete closure of the ureter leads to renal atrophy. If hydronephrosis follows ureteral occlusion, it develops more rapidly after complete closure, but never attains the immense size possible when the obstruction is incomplete.

3. There is almost no reason for believing that any appreciable general toxemia arises as a result of unilateral ureteral obstruction. Likewise, renal reabsorption is rare, and changes in the other kidney are slight.

4. Concerning the length of time that the ureter may be entirely obstructed without destroying renal function, there is no unanimity of opinion. The findings of various investigators vary all the way from total loss of function in three weeks to complete restoration after fourteen weeks.

5. A slight increase in intraureteral pressure stimulates renal secretion. After sudden complete closure of the ureter, the pressure within rises in a few hours to an average maximum of about 65 mm. Hg. During the next few weeks, there is a gradual fall which reaches nearly zero in a few months.

B. *Writer's Experiments.*

1. During the first ten days after complete ureteral occlusion, the gross changes are not marked; a slight hydronephrosis is practically the only lesion found.

2. From the tenth to about the sixtieth day constitutes a period of primary hydronephrosis, during which no general renal atrophies were found.

3. At the expiration of about two months, the kidneys are divided into two groups: (1) those that continue to enlarge and (2) those which undergo general atrophy. In fact, prior to the sixtieth day there is some intimation of this division, some of the kidneys being small and thus suggesting future shrinkage, while others are already markedly cystic as if destined to form the large cystonephroses of later months.

4. More or less gross evidence of intrarenal infection is almost constant after the tenth day. If this is only mild, general atrophy takes place, apparently in spite of it (possibly because of it); if the infection is severe, pyonephrosis with renal dilatation, etc., supervenes. It seems more than likely that the less the infection the more prompt and marked is the general renal shrinkage and fibrosis. All of my evidence points toward a hematogenic origin of this infection.

5. Perirenal anastomoses do not seem to favor the development of hydronephrosis, for adhesions were much more marked in my atrophy series than in most of the large hydro- and pyonephroses.

6. There is considerable evidence that low ligations are much more prone to be followed by atrophy than are high ones. This may be explained by assuming that when the occlusion is high, all of the back pressure must be borne by the kidney alone; hence it dilates comparatively rapidly. If, however, the obstruction is low, the thin-walled ureter by dilating more rapidly than the thick-walled kidney may act as a sort of safety-valve thus relieving somewhat the pressure within the kidney.

7. As far as it was possible to ascertain, young dogs were more liable to infection and consequent cystonephrosis than old ones. The most marked pyonephrosis in Group II, four of those in Group III and the worst infected and least atrophied kidney in Group IV are all known positively or probably to have occurred in young individuals. The two dogs in which general renal atrophy was most marked surely were not young and appeared to be rather old.

8. Although no actual readings of intraureteral pressure were taken, the writer observed that usually his ureterorenal cystoses were more or less flaccid. Only rarely did the contents seem to be under pressure, and this condition was found usually either within a few days after ligation or later if considerable infection was added. Scroggy's observations are precisely similar and give the impression that the intrarenal pressure is not great enough in most cases to account entirely for the development of hydronephrosis.

9. If one exercises as much care in dog surgery as in human sur-

gery, neither the morbidity nor the mortality of sudden complete ureteral obstruction are high. This is especially true if one succeeds in avoiding severe infection.

C. Operative Injury of the Ureter in the Human.

1. The ureter is injured probably in from 1 to 3 per cent. of all intraperitoneal operations upon the female pelvic organs. This accident is more common by the vaginal than by the abdominal route.

2. The causes of these injuries are as follows: *a.* Displacement or intimate involvement of the ureter by pathological structures in the pelvis, especially uterine and ovarian tumors. *b.* Congenital abnormalities. *c.* Lack of care by the operator.

3. The different kinds of ureteral injuries, stated approximately in the order of the frequency of their occurrence are, *a.* ligation, *b.* clamping, *c.* kinking (these three usually produce complete occlusion), *d.* incision, *e.* resection and *f.* destruction of blood supply. Complete obstruction may lead to the following results, named approximately in the order of their seriousness: local—*a.* infection (15 per cent.), *b.* fistula (24 per cent.), *c.* hydronephrosis (80 per cent.), *d.* general renal atrophy (less than 20 per cent. in Barney's series); general—*e.* toxemia (very rare), *f.* anuria (1.6 per cent.), *g.* no symptoms (21 per cent.). The mortality of unilateral ureteral obstruction is 18 per cent.

4. In the diagnosis of ureteral obstruction, the most important means is the ureteral catheter.

5. The prevention of injury to the ureter usually may be accomplished by a careful unravelling of the pathological anatomy in each case beginning high up where the conditions are normal and where the ureter is easily found. One cannot rely too much on normal anatomy. In ligating pelvic vessels, isolate each one before tying. The preliminary passage of the ureteral catheter will practically insure the safety of the ureter. Above all, the surgeon must realize the imminence of the danger—that injury to this duct together with hemorrhage constitute the two chief dangers of hysterectomy.

6. Intentional ligation of the ureter may be indicated in irreparable injuries to this duct, in order to get rid of the kidney functionally. In these cases, the procedure replaces immediate nephrectomy. The kidney may be removed later, if necessary; but if no serious symptoms arise, nothing further need be done. Even

though it is technically possible to repair the ureter, the patient's condition may not allow prolongation of the operation. In this instance, the ligation is a strictly temporary measure to be followed by an early secondary operation for the restoration of the ureteral lumen, before the function of the kidney becomes seriously impaired. This procedure has been used by a goodly number of our leading gynecologists, and holds excellent promise of becoming an established procedure in selected cases.

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15 E. WASHINGTON ST.

PSEUDOSTRUMA OF THE OVARY.

BY

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(With five illustrations.)

SINCE struma of the ovary, so-called, has been incorrectly interpreted in text-book descriptions the following case is reported:

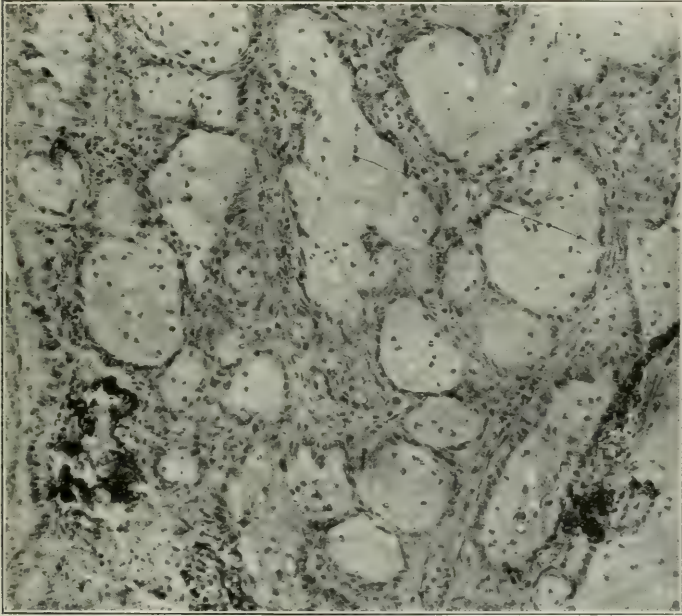
A negroes of twenty-seven, married, entered the Woman's Hospital, February, 1914, with a complaint of dysmenorrhea and pain in the lower abdomen.

Examination showed an enlarged uterus and enlarged tubes on both sides. There was no palpable abdominal tumor. At operation by Dr. Grad a greatly enlarged and hard left ovary was found, which was removed, together with both tubes, which were also enlarged.

The left ovary with the tube attached formed a cystic tumor, 6 cm. in diameter. The fimbriated extremity of the tube was closed, and

the tube was thickened, tortuous and covered with adhesions. The outer surface of the ovarial cyst was smooth, the walls were 1-3 mm. thick. On section of the cyst a gelatinous fluid escaped, amounting to 2-3 ounces. This resembled ordinary pseudomucin. The inner cyst wall was smooth and showed numerous yellowish, transparent, papillary elevations. There was a solid area in the cyst wall, measuring about 1 cm. in diameter, which was composed of very numerous minute chambers, all filled with the same character of gelatinous fluid found in the main cyst. The ovary appeared flattened on the surface of the main cyst wall, and was about 3 cm. in long diameter.

Sections were taken of the remains of the ovary, of the solid portion of the cyst and of the tube.



(A) Struma-like portion of cyst.

Contents staining bright pink with eosin.

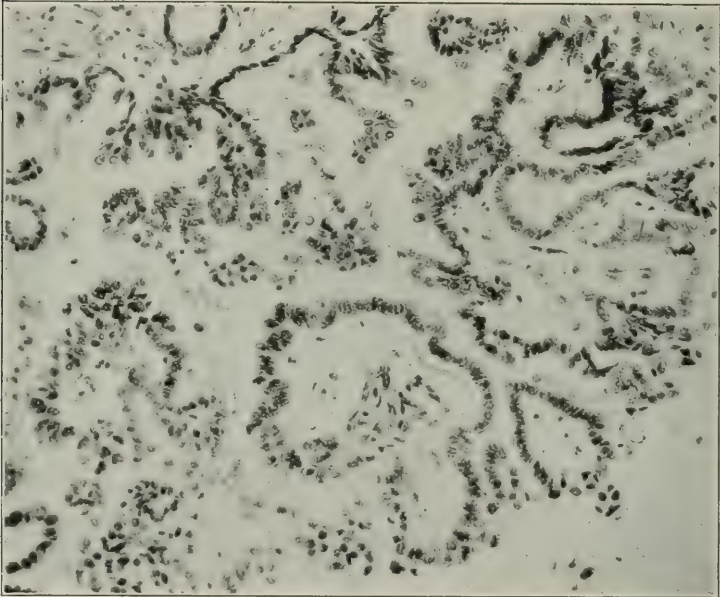
The sections of the solid portion of the cyst show glandular lumina, lined for the most part by a single layer of low columnar epithelium. The contents of the lumina are dense, eosin-staining, homogeneous masses containing a few desquamated epithelial cells. The whole picture of glands and contents closely resembles struma thyroidei. But from this most marked condition the contents pale out and ultimately stain very faintly or in places even bluish. The amount of stroma between the lumina is minute, and is occupied by proliferating epithelial cells, which show optical unrest. In places this becomes definite carcinoma. Other portions of the cyst wall show

a typical papillated serous cystoma, the epithelium of the papillæ being in active proliferation.

There are numerous psammomatous granules throughout the papillæ.

Sections of the remains of the ovary show normal stroma, Graafian follicles and small cysts of the follicles. The germinal epithelium has very largely disappeared, but in regions adjacent to the cyst it is present in small islands, and here it is proliferating actively, and forming papillations and small depressions. The transition into the papillated cystic portion with the struma-like appearance can be followed directly.

Sections of the Fallopian tube show a somewhat thickened wall, with some adhesions between the plicæ.



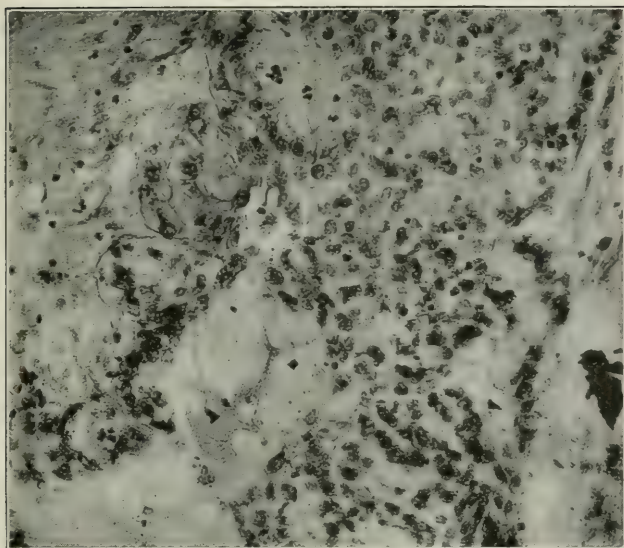
(B) Papillated portion of cyst.

Epithelium is not of pseudomucinous type.

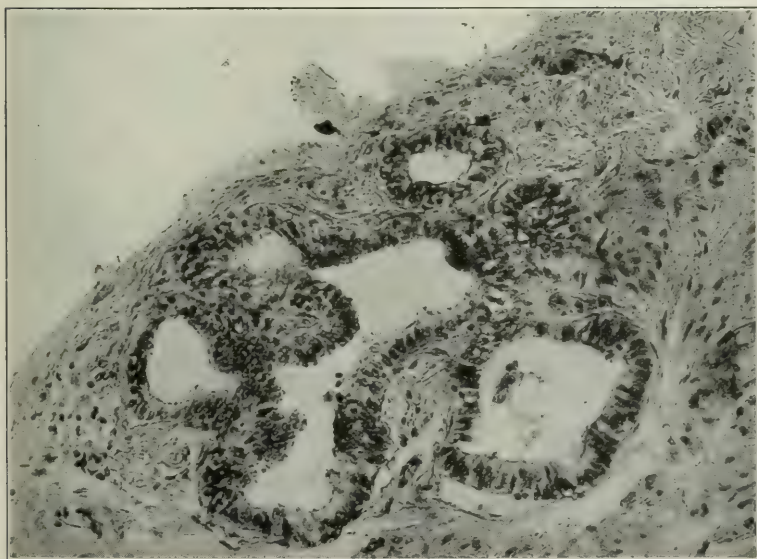
Around the periphery of the tube occur a series of glandular lumina, not surrounded with definite mantles of musculature or cytogenic stroma. The epithelial lining of these tubules is high columnar, and shows evidence of papillation. The epithelium in places shows slight optical unrest. Adjacent to these lumina is a strip of epithelium, apparently the wall of a cyst. This is of the same type as that of the lumina.

Sections embracing the mesovarium show a few 'Markschläuche' of normal appearance.

There is a normal germinal epithelium covering the ovarian portion



(C) Carcinomatous portion.

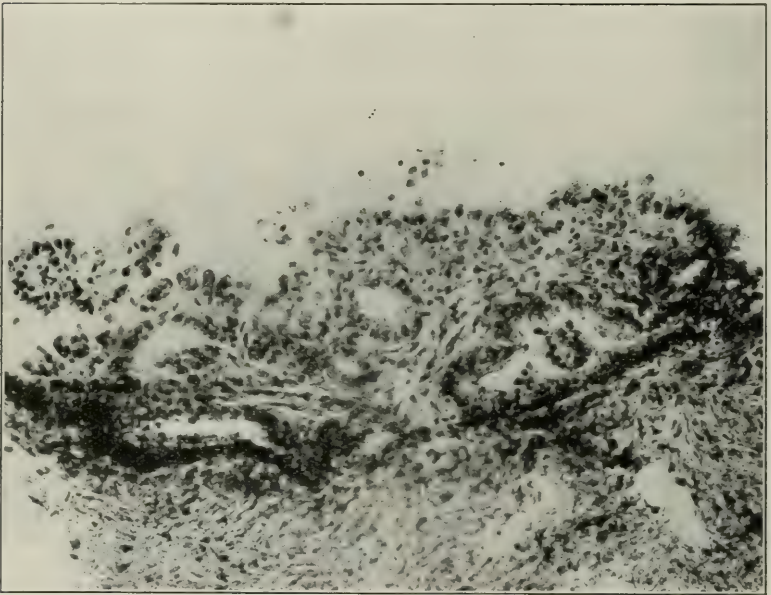


(D) Wolfian tubules, higher magnification.
Epithelium showing optical unrest.

of these sections, and it is plain that the cystoma did not take its origin from this region.

There are, then, in this ovarian cyst first areas presenting the usual appearances of a papillary cystoma of the serous type. Then appear areas corresponding to the published descriptions and illustrations of struma ovarii. Finally, there are places where this condition has advanced to evident malignancy. Nowhere are there any tissues which might be referred to a teratoma, unless indeed the struma is of that origin. The tube presents unusually plain fetal rests, which show a degree of papillation and optical unrest similar to that of the cystoma.

The interest of this case lies in the light it throws on the origin and histogenesis of the condition known as "Struma Ovarii."



(E) Germinal epithelium of ovary, papillated and proliferating.

Until recently this has been regarded as of teratomatous origin. Pick's original case was a teratoma, with other ectodermal structures than the thyroid. Pick then examined twenty-one dermoid cysts, and found six of them with struma-like tissue. From this he concluded that struma ovarii was a teratoma with suppression of all tissues except thyroid.

Borst states that however much a struma ovarii may be regarded as a special form of teratoma, yet it is just as easily conceived from the structure and development of the ovary that a tumor with

thyroid appearances could have arisen from a follicular adenoma which has nothing to do with a teratoma. Similarity, then, does not imply identity.

There have been cases of struma ovarii published which have only a very vague resemblance to struma thyroidei, and we see from these that a beginning adenoma may somewhat resemble a struma. Erwin Bauer has recently published (*Zeitsch. f. Geb. u. Gyn.*) a case of struma ovarii which he traces as arising from the superficial germinal ovarian epithelium, and he concludes that some cases at least are merely papillary cystomata. The main conclusion he makes is that the origin of papillary cystomata is from the germinal epithelium.

While Bauer's illustrations are not entirely convincing, and while transitions are not absolute proof of origin, it is presumable that the papillary cystomata do arise in this manner. However, of the relationship of his struma with a papillary cystoma there can be no doubt, and likewise the present case affords another instance of this origin.

The unusually numerous and well-formed Wolffian rests of this case, with their tendency to papillation and proliferation of the cells, suggests the possibility of an embryonal origin of the cystoma.

Although the germinal epithelium may be the site of origin, it may be that the Wolffian rests indicate an embryonal condition which is the basis of the cyst formation.

The teaching of a teratomatous origin no longer holds for the majority of these tumors, although it is undeniable that a teratoma may form a struma, and that this embryonal structure may overgrow and suppress all others. For these rare cases alone is the designation of struma ovarii acceptable.

For the present case, as well as Bauer's the most correct term would be "Cystoma ovarii papillariforme pseudostrumosum."

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WOMAN'S HOSPITAL.

REPORT ON A CASE OF RUPTURE OF CORPUS
LUTEUM WITH INTRAPERITONEAL
HEMORRHAGE.*

BY

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AT or about the height of menstrual congestion, the normal mature Graafian follicle ruptures spontaneously on reaching the peritoneum covering the surface of the ovary. The evolvment of the corpus luteum follows in this fashion—the cavity of the ruptured follicle is at first filled with blood, later this is encapsulated and the central portion becomes lighter in color and clearer, the capsule thickens and infolds toward the center while the color of the entire mass changes to a paler red verging on yellow and then to a yellow, hence its name. In the event of pregnancy not ensuing, within the month the corpus luteum shrivels until it is a small depression on the surface of the ovary; should pregnancy occur, however, it becomes larger, almost one-third the size of the ovary, remaining stationary until the middle of pregnancy when it begins to atrophy and at term is only two-thirds of its original size. A month later it is only a small mass of fibrous tissue (1).

When we consider the soft consistency of the normal young ovary and the succession of physiological breaks in its cortex and remember the varying changes in intraabdominal pressure that do occur, some of the conditions may be explained that are found in later life where a “normal” ovary is a rarity.

The following case serves as a basis for the writing of this paper:

R. S., Hosp. No. 36381, age nineteen, single, was admitted to Lebanon Hospital on Feb. 29, 1912, in the service of Dr. Parker Syms, with the following history: two days before admission this patient was seized with severe abdominal pains which were cramp-like in character; this was followed by retching and vomiting. The pains were general at first but later became localized in the lower abdomen, most marked on the right side. After a severe attack of vomiting the patient stated she felt very faint. Bowels were constipated. Menstruation had occurred normally nine days before admission. There was no history of any previous attack. Temperature 101.8°, pulse 100, respiration 26.

*Read at a meeting of the section on Obstetrics and Gynecology, N. Y. Academy of Medicine, 1914.

Physical Examination.—Fairly well nourished but slightly anemic. Heart and lungs negative. Liver, kidneys and spleen not palpable. Over the lower half of the abdomen there was some muscular resistance on the right side, but no distinct rigidity. No masses felt. As the patient was unmarried, no vaginal examination was made.

Operation.—Feb. 29, 1912. Dr. Bookman. Gas and ether anesthesia. Abdomen opened through a low right rectus incision and on exposure of the peritoneum the dark blue-violet color, seen in cases of ruptured extrauterine pregnancy was noted. On opening the peritoneum there was an escape of a considerable amount of fluid and clotted blood which caused the cecum to prolapse into the wound; appendix found markedly congested and with the cecum was wrapped in a taped pad and returned within the abdomen. A number of blood clots and bright red blood were sponged out of the pelvis from whence the bleeding seemed to come, the uterus was steadied with a volsella forceps and the adnexæ explored. The left tube and ovary were found normal as was the right tube. The right ovary was the size of a small hen's egg and there was considerable bleeding from a small perforation near the hilum. As several sutures cut through, the ovary was ablated. The appendix was now removed and the abdomen closed in layers without drainage. Patient discharged cured on the fourteenth day.

Pathological Report.—Ovary shows some fibrous degeneration of a corpus luteum which has ruptured. Appendix shows some exudative inflammation with congestion of the vessels under the peritoneum.

The sequence in this case was undoubtedly first a mild appendicular inflammation and with the increased intraabdominal pressure from the attendant vomiting the corpus luteum was ruptured with the resultant free intraperitoneal hemorrhage; the symptoms of the mild peritoneal irritation caused by the latter tending to further complicate matters.

Primrose(2) in a paper reports two cases of intraperitoneal hemorrhage due to a rupture of a normal Graafian follicle. His two cases are of interest, the first having been caused by a strain while lifting a heavy weight and the second being coincident with an attack of acute suppurative appendicitis. He is the first we believe to point out the coexistence of the appendicular affection and the condition in the ovary. He also mentions the fact that straining of any sort has a distinct etiological significance whether induced by voluntary effort or by vomiting. Jayle is reported by him as citing two cases in which a blood cyst was ruptured during an examination under an anesthetic.

Primrose goes on to deplore the paucity of mention of any accidental rupture of the corpus luteum in the text-books, most of which ignore the subject entirely or dismiss it with a mere statement of its

possible occurrence. On searching the literature, however, he was able to find numerous papers on the subject and mention of this condition was made as far back as 1851 by Nélaton. Peuch in 1858 applied the term "apoplexy of the ovary" to the rupture of the Graafian follicle with injury to the ovary.

In the discussion that followed the reading of this paper, several men reported similar cases and Maurice H. Richardson of Boston stated that "he had frequently seen a ruptured Graafian follicle and had removed more than one ovary, considering it to be the cause of an intraperitoneal hemorrhage, which now he believed might have been simply an excessive hemorrhage during menstruation without any pathological significance whatever."

Luker(3) mentions a case of rupture of a corpus luteum into an intraligamentous cyst. Warnshius(4) records a case in a young girl, probably hemophilic in origin, with symptoms of acute appendicitis which was complicated by a severe nasal hemorrhage and an intramural hematoma. Adams(5) reports a case of hemorrhage from a corpus cyst clinically similar to the one reported herein. Bonneau(6) also notes a case.

Most of the cases are reported under the caption of ruptured hemorrhagic cysts of the ovary, ovarian hematomata or ovarian hematoceles. Hedley(7) concludes after a careful study of eighteen cases that "there seems to be no reason to doubt that the actual process of formation of ovarian hematomata is one of rupture of several or many Graafian follicles into one another instead of on the surface of the ovary separately." Savage(8) divides these hematomata into two types, (a) of the Graafian follicle, and (b) of the corpus luteum. These local collections of blood clots in the region of and intimately connected with the ovary have often been mistaken for a ruptured extrauterine pregnancy on superficial examination.

It seems to us that the difference between the ovarian hematomata and those cases in which the blood suffuses the peritoneal cavity, is only one of degree; in the former the blood is extruded slowly from the tear in the ovary and in the latter the blood is poured out so rapidly that there is no chance for clotting, thus giving symptoms of free blood in the peritoneal cavity. The classification of this condition into the affections of the Graafian follicle and those of the corpus luteum is also misleading, in as much as the Graafian follicle is but the immediate precursor of the corpus luteum. The small blood cysts on the surface of the ovary are formed by the proliferation of a layer of lutein cells over the site of the physiological rupture in the cortex of the ovary and the persistence of this membrane leads to their

formation. According to Cohn(9) the peritoneal cavity communicates with the inner part of the ovary for a time at the seat of the rupture of the follicle and the layer of lutein cells mentioned is further thinned out by the accumulation of fluid in this space; this new cyst may rupture and tear the ovarian stroma if the pressure is strong enough and the various degrees of hemorrhage follow. The source of the hemorrhage as just stated is from the ovarian stroma if the causative pressure is strong enough and the natural conclusion must be that if it is a vein that is torn the bleeding is slight with more opportunity for clotting to take place whereas if an artery is injured the hemorrhage is apt to be more severe and inundate the peritoneal cavity.

How often are cases seen in young girls where they complain of severe pain at a menstrual period, with a slight elevation of temperature and some nausea and vomiting and how often are these cases ascribed to having caught "cold" or to an attendant catarrhal salpingitis, where the condition is no doubt due to a small pelvic hemorrhage from a torn corpus luteum.

The so-called pelvic hematoceles are undoubtedly caused by a similar process with subsequent encysting of the blood, and many of the adherent ovaries with normal tubes may be attributed to this cause.

The diagnosis is difficult. From a low acute appendicitis of a mild type, the differentiation is almost impossible, the diagnosis can only be surmised at, but if the hemorrhage is severe the attendant anemia may serve as a diagnostic guide. From a ruptured extrauterine pregnancy it differs in the fact that the history of irregular bleeding, decidual fragments and the physical signs of a tubal mass are lacking. Judging from the literature it seems that this condition has never been diagnosed accurately.

The cases in which the blood is confined to the pelvis are not difficult to treat; the affair is self-limited and the treatment is symptomatic, but in those cases where the hemorrhage is more severe and symptoms of peritoneal irritation due to the free blood are present, the treatment is essentially surgical.

The prognosis is usually good except in those cases associated with pathological blood conditions.

Conclusions.—Suddenly increased intraabdominal pressure or trauma predisposes to the rupture of the forming or newly formed corpus luteum.

The small so-called hemorrhagic cysts of the ovary when ruptured may easily cause laceration and bleeding.

Cases of intraperitoneal hemorrhage due to this cause are fre-

quently mistaken for ruptured extrauterine pregnancy or acute appendicitis.

Ovarian apoplexy, ruptured hemorrhagic cysts of the ovary, ovarian and pelvic hematoceles (when due to no other cause), ovarian hematomata and hemorrhage into the peritoneal cavity from a ruptured corpus luteum, may all be grouped as having the same etiology and differing only in degree.

With acute pelvic pain at or about the time of menstruation, slight rise of temperature, signs of peritoneal irritation with some anemia and a history of straining, the existence of a ruptured corpus luteum must be kept in mind.

Treatment of the mild cases is symptomatic, of the severe cases, surgical.

Prognosis is usually good in all cases except in those cases with associated pathological blood conditions.

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ABDOMINAL WALL HERNIA—OBSERVATIONS IN THE PRINCIPLES AND BEHAVIOR.

BY

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(With 3 illustrations.)

THE apathy of the laity toward the always possible dangerous consequences of "neglected" *herniæ parietalis*, accentuates materially the necessity for a very thorough study of their principles and behavior, especially as these have been neglected compared to the much greater attention to methods of operation. This need becomes still more apparent when we remember that nearly one-fifth of all people have a parietal rupture of some kind.

An *abdominal wall hernia* should always be construed as meaning a protrusion or bulging of some of the intraabdominal viscera (usually of the longer mesenteried intestine and omentum), from within the abdominal cavity into some weak and distended place in the abdominal wall, the thinned layers of which (usually with the peritoneal sac) form the hernial coverings.

Where there is a complete opening in the abdominal wall, as after a penetrating stab wound, and naked viscera protrude entirely through, without any parietal covering whatever, it is technically a *prolapsus* and not a *hernia*; these, together with the diaphragmatic and intraretroperitoneal (Treitz duodenojejunal pouch, the recessus retrocaecalis, subsigmoidea, and Virchow's Douglas sac) *herniæ* do not belong to this paper.

Males, because of the frequent patency of the processus vaginalis due to descent of the testicle and the more violent exertion in their daily life and consequent frequent sudden increases of intraabdominal pressure, are naturally more prone to the development of *herniæ* and their dangers than are females.

The total *herniæ* in children, adult men, and women operated in Cook County Hospital, Chicago, numbered 3000 in the last seven years. Besides witnessing a very large number of the *herniæ* operations performed by other members of the Surgical Staff during

these years, there occurred among the 10,200 male patients received into my children's and adult surgical wards 8 1/2 per cent. or 840 cases of hernia which were operated either by myself or my ward colleagues for rupture of some kind, either inguinal, umbilical, femoral, or ventral, while many others with small and some with even large hernia refused operation; being in the hospital for some other surgical lesion.

Of the 840 male cases, 82 1/2 per cent. were indirect or direct inguinal herniæ (of which one in every seventy cases had an undescended testicle). Bilateral herniæ in the inguinal region occurred once in every forty cases, and was especially common in the older male patients. Eight and one-fourth per cent. were umbilical, 4 3/4 per cent. ventral (other than umbilical), often postoperative, especially following drainage, 4 3/4 per cent. were femoral, occasionally bilateral; and of quite late development; as for instance, a cab driver, aged fifty-five, had an umbilical and bilateral femoral herniæ; and another strong man, aged sixty, developed a femoral (nonstrangulated) hernia suddenly after violent exertion; while the inguinal regions in both of these men remained intact. A hematoma in the latter case in the preperitoneal (extra sac) tissues gave it the permanency of an enlarged gland, making the diagnosis very difficult.

In our women's surgical ward in Cook County Hospital 6654 general surgical and gynecologic cases were admitted in the seven years. The proportion of women to men presenting themselves for hernia operations was about two women to seven men, or 2 1/2 per cent. women to over 8 1/2 per cent. men. This only represents a very small percentage of the actual number of women suffering from hernia, and indeed of those entering the hospital and operated for hernia, for in many of the women with small umbilical herniæ, on whom laparotomies were performed for some pelvic lesion, the presence of and operations for the umbilical hernia were not recorded.

Of these, 2 1/2 per cent. of women with (recorded) herniæ, umbilical constituted 13 per cent.; ventral (probably also including many umbilical) 50 per cent.; epigastric 5 per cent.; inguinal 10 per cent.; femoral 18 per cent.; all of the last being in multiparæ and only one nonstrangulated.

Umbilical and ventral herniæ and diastasis recti naturally were very frequent in parous women due to the enormous distention of the abdominal wall in the latter months of pregnancy and the bearing down in labor, especially in those women with flat (contracted) pelves and pendulous abdominal walls.

THE CAUSES OF HERNIA IN BOTH MALE AND FEMALE.

Congenital weaknesses or deficiencies in development or closure in infancy and childhood are too well known to need further mention. In the adult cases they are probably often old herniæ neonatorum, which had apparently (according to the history of only recent development) closed perfectly in infancy or childhood, and almost unexceptionally occurred at the usual (normally) weakest parietal points. (a) The inguinal region (where besides the inguinal canal for the spermatic cord (male) or round ligament (female) there was also frequently a patent processus (peritonei) vaginalis. (b) The femoral region just internal to, and also where the femoral vessels pass under Poupart's ligament to the leg. (c) The umbilical region where congenital (omphalocelic) thinness and diastatic recti were frequently remarked, especially in women, even while operating cases without any hernia.

(d) Ventrally at the lower third and external border of the rectus; while herniæ in the sciatic and obturator foramina and Petit's triangle regions were not encountered.

If one deficiency in development was present, each of the other common sites for hernia were very carefully examined (especially in children) both when standing and coughing; for even though only one hernia had as yet developed, the rule of bilateral or even multiple congenital lesions was always borne in mind.

In the adult with only one congenital hernia developed, the probability of this being the only one, was found much greater.

Acquired herniæ in well-developed muscular adults, occurred most often in laboring men, athletes, and multiparæ at these same weaker places, which, though there was supposedly no congenital defect present, yet were apparently unable to withstand the oft-repeated, enormously increased intraabdominal pressure during violent exertion.

In these acquired adult cases also, the writer often found a weakness or slackness either in the peritoneum itself, or in the pre-peritoneal (para-) tissues, perhaps congenital but very possibly, especially, in old multiparæ acquired, due to the enormous peritoneal and para-peritoneal stretching of pregnancy, allowing an easy sliding, due perhaps to faulty postpartum involution; for who has not seen cases repeatedly of very wide open rings and short inguinal canal in male and female where the peritoneal and para tissues were so firm that no hernia developed even though subjected to the most violent physical exercise? Hessert's observation of slight de-

velopment or absence of the male conjoined tendon was verified by the writer in several cases.

An abnormal length of the intestinal mesentery, especially noted in vegetable eaters (Slav-Europeans), as well as perhaps unusual lowness of the parietal mesenteric insertion, probably also allowed greater strain on the predilection places.

The acquired herniæ in fat people due to excessive parietal fat infiltration of the preperitoneal cellular (para) tissue which tends to draw the parietal peritoneum outward, making a kind of peritoneal depression or pocket on its intraperitoneal side (Roser), thereby as it were favoring a centering of the intraabdominal pressure at one place, viz., in this pocket, apparently were not frequent.

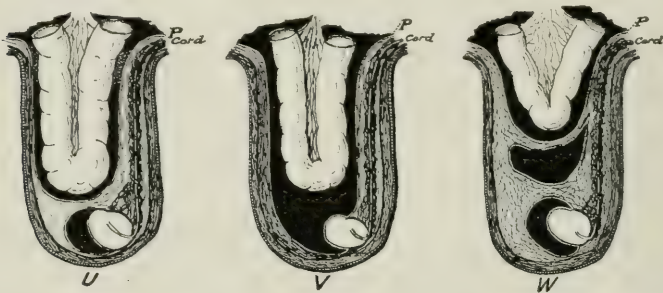


FIG. 1.—U. CONGENITAL HERNIA. (P. peritoneum) The patent processus vaginalis forming the sac. The tunica vaginalis is closed. (irreducible or incarcerated by adhesions at the neck.) V. CONGENITAL HERNIA. (P. peritoneum) Both the patent processus and patent tunica form the sac (rare). W. ACQUIRED HERNIA. (P. peritoneum). The processus was closed at internal ring but not obliterated and now appears as congenital hydrocele of the cord with acquired hernia.

The lumps of extraperitoneal fat in the region of Poupart's ligament were very common even in thin people. The writer considers them lipomata, and believes with others that their recent growth in size had often pulled the peritoneum down forming a sac, and that if situated higher up an inguinal, if lower down a femoral acquired hernia develops; indeed, it may occasionally be purely a matter of accident of growth as to whether it passes above or below Poupart's ligament. A splendid demonstration of this recently occurred in a case of *femoral hernia* operated by Dr. Geo. de Tarnowsky, of the Surgical Staff, at Cook County Hospital, as well as in several of the writer's cases.

While easy sliding and marked friability of fatty preperitoneal and fatty intramesenteric tissue is well known to every laparotomist, we must also concede that muscular (parietal) weakness due to

fatty infiltration of the muscles, also probably partially accounts for the acquiring of herniæ in some of the cases previously attributed entirely to the preperitoneal fat theory.

The sudden appearance of a true hernia, according to the Leipsic School, preconceives the already formed sac, into which the suddenly excessively increased intraabdominal pressure, *e.g.*, lifting weights, etc., simply pushes the intestine, or the omentum, or both, at the time of the supposed sudden occurrence of the hernia.

One must admit, however, the *sudden formation* of noncongenital herniæ due to trauma with more or less acute peritoneal sliding and stretching and even some tearing of the other parietal tissues, even if in most cases the development is gradual, and is only noticed when it suddenly enlarges.

Multiple herniæ from senile atrophy, were most frequently found at the same weaker, inguinal, femoral, umbilical and other mentioned regions. The performance of frequent herniotomies in old people leads one to believe that the atrophy of old age is doubly rapid at these places. Indeed, there was often also a congenital defect despite which no hernia developed till late in life and then only after violent exertion, or the oft present chronic cough.

The inaction atrophy of a sedentary life probably also predisposes to hernia, especially if the atrophied abdominal parietes are suddenly subjected to unusually violent or repeated unaccustomed strain.

That the testicle, though originally an extraperitoneal organ, may become slightly intraperitoneal before descent into the scrotum, was apparent in some of the "*undescended*" cases operated, indeed, the writer believes that the intraabdominal intestinal pressure probably pushes the testicle through the inguinal canal (guided by the gubernaculum) into the scrotum, and that perhaps undue length of intestinal mesentery allows the intestine to often keep the processus vaginalis open till too late to close congenitally, resulting in a congenital hernia; also that if closure of the processus occurs, a continuance of the congenital predisposition to peritoneal sliding in this region results later in an acquired hernia.

Lastly, postoperative herniæ, due to unusually rapid absorption, or breaking of catgut, suppuration of or drainage through the abdominal wall, were much less frequent in the carefully imbricated cases than in those following, edge to edge, fascia coaptation.

The Innermost Parietal Peritoneal Coverings of a Hernia.—The sac, and the sac neck, received special study, *e.g.*,

(a) In the male inguinal herniæ (from which, due to their fre-

quency, most of my deductions are made) the congenital sac was most commonly the patent processus vaginalis alone (the tunica usually being closed), less often both the processus and the (unclosed) tunica vaginalis composed it.

(b) The acquired hernial sac was usually formed from that part of the parietal peritoneum that immediately lined the weak place in the abdominal wall, if purely by sliding (*par glissement*) the recent sac was of ordinary peritoneal thickness, but if by stretching thinner than normal, being pushed into the herniated parieties through the more or less narrow opening (neck) by the viscera or omentum that protruded into it. Old hernial sacs were often thick



FIG. 2.—X. CONGENITAL HERNIA. With extraperitoneal undescended testicle lying in the inguinal canal; the partially formed tunica and processus have become widened to form the sac. Y. ACQUIRED HERNIA. With internal adherent folds, stenosis of first sac neck, which may become entirely closed in some cases, giving rise to acquired hydrocele of the cord and acquired hernia. Z. ACQUIRED HERNIA. (P. peritoneum) with marked parietal peritoneal sliding so that the cæcum forms an extra sac sliding hernia (SH) while the small intestine lies within the sac, making close tying off and incision of the sac impossible.

in the distal, thin in the proximal portion or *vice versa*, pointing to recent rapid “stretching” enlargement.

Besides the “lean sac” with perhaps the paraperitoneal fat tumors, there was the actual “fat sac” which was so uniformly and thickly covered throughout with fat as to cause doubt as to its identity till cautiously opened at the apex.

(c) A total absence of the hernial sac is perhaps impossible, though the extraperitoneally situated cecum (which on its posterolateral parietal surface often has no peritoneum) may be gradually dragged by the enlarging true sac of a right oblique inguinal hernia, causing traction on, and sliding of the loosely attached cecoparietal (*para*) connective tissue, thus forming, as it were, a *sacless cecal wall hernia* was encountered in several cases.

The urinary bladder wall (extrasac) hernia also especially liable in either right or left direct inguinal rupture, occurred in three cases. To a less degree possibly the sigmoid wall in left oblique inguinal hernia might be implicated in the same way.

In these cases there was always a true hernial (parietal peritoneum) sac, which had or now contained small intestine, or omentum, or both, and outside of which true sac, one came directly on to the bared cecal, or bladder, muscle wall, making close transfixion, tying, and excision of the true sac neck impossible without injuring the wall or circulation of the extrasac viscus. The base of the well-drawn up and wiped down (opened) sac was always examined carefully by both touch and sight to avoid this error. The hernial sac may also be only "apparently" absent, *e.g.*, where there has been an early low-grade adhesive inflammation before the sac fluid transudes, or perhaps after its absorption, and the (parietal) peritoneum of the sac has become partially or wholly adherent to the (visceral) peritoneum lining the contents (hernia accreta).

The (usually thicker) adherent sac and intestine together warn one of the danger in time to avoid opening the viscus at the operation.

While, however, in incarcerated herniæ with moderately tight neck, there is due to the venous compression and engorgement, usually an early trans- or exudation of fluid separating the (visceral) peritoneal covering of the contents of the sac (intestines, omentum, etc.) from the (parietal) peritoneal sac—the *so-called sac or hernial fluid*; the strangulated hernial sac was in some cases found absolutely dry, possibly due to an early arterial and venous thrombosis.

The form of the hernial sac was generally more or less irregularly spherical, or pear, or bottle, or cylindrical shaped usually with a much longer neck in the oblique inguinal and femoral canal herniæ than in the direct inguinal, umbilical, or ventral.

Diverticulæ in the sac and subcutaneous burrowing were especially common in umbilical and occasionally in ventral herniæ. The femoral sac for the same reason often extended suprapoupartal in the looser abdominal subcutaneous tissues and simulated an inguinal hernia. In one inguinal hernia two sacs occurred side by side, separated by a rigid bridge of parietal tissue forming in reality two distinct herniæ.

The constrictions in continuity often encountered in (oblique inguinal) sacs, or indeed points of complete closure, one above the other, admit of various theories. The acquired sac, and to a less

degree the processus, drawn as they are from the wider parietal peritoneal radius, gradually (by sliding) become enlarged, the former



FIG. 3.—SCHEMA OF STRANGULATION.

J. Strangulation (Lossen) by compression of the distal by the proximal loop of intestine. P, Parietal peritoneum from which the sac is derived. K. Strangulation (Busch, Scarpa) Kinking of the distal or proximal, especially the distal loop at the ring with narrowing of one or both. L. Strangulation (Kocher and Roser). Wedge and valve theory. (See text.) N. Littre's partial circumference hernia. O. False reduction in which the loosely attached peritoneum on one side only has become loosened, the hernia still in the sac has been reduced into the preperitoneal space on the loosened side. Q. False reduction with tearing off of the sac neck which though reduced, still holds the bowel in strangulation. R. False reduction by an even circumferential loosening of the preperitoneal tissues into which the hernia in the sac is reduced (en bloc). S.F. Transverse section of the neck of the sac showing folds which usually become interadherent and cause increased narrowing and rigidity of the neck which in the reduced hernia may result in spontaneous recovery and in the nonreduced strangulation. E S.F. Vertical section of empty sac showing schematic folds at neck. I.H. Irreducible (incarcerated by adhesions) hernia in which neither the passage of feces through nor the circulation is impaired.

by the enlarging hernia, the latter by the descending testicle or both, are necessarily thrown into folds at the neck. These folds become

interadherent often causing a marked thickening and increased narrowing of the neck of the sac.

(a) If a hernia be reduced, this pleating, thickening and narrowing at the sac neck may retard the intestine from reherniating at least in the original sac. (One interesting case, A. P., a seventeen-year-old boy with a patent processus vaginalis exercised regularly for five years without any signs of inguinal hernia till reduced in flesh by a protracted (possibly tubercular) bronchitis, was operated by the writer at the Presbyterian Hospital in 1910.) As, however, the weakness in the rest of the layers of the abdominal wall often persists (especially in the para-tissues) with perhaps a tendency to peritoneal sliding if subjected to great strain, a recurrence of the hernia in a new sac formed proximal to the first often results. Dr. Wm. Hessert, of Chicago, in discussion mentioned the exceedingly interesting case of recurrence of the hernia in a new sac with intestinal strangulation in the thickened, narrowed neck of the original sac at the bottom of the scrotum.

(b) If a complete closure of the empty sac at the narrowed first sac neck of an acquired hernia should take place and the hernia recur, a true double sac would result, one above the other, the completely closed original blind sac remaining empty; or becoming filled with fluid. (Hernia with acquired hydrocele of the cord.)

Again should the peritoneum be strong and the preperitoneal (para) tissues not disposed to sliding, and the other parietal layers be normally developed, the complete closure of the neck of an empty original sac may result in complete *spontaneous recovery from the hernia*, while the sac, if it fills with fluid, forms a cyst (acquired hydrocele of the cord without hernia). (The writer assisted the late Dr. Henrotin in closing the sac neck of an empty inguinal hernia sac by a purse-string suture (intraperitoneally) in a strong, hard-working nulliparous woman, in whom the hernia has not reappeared after five years of the hardest kind of work—demonstrating the strength of the peritoneum and paraperitoneum in some cases. The abdomen had been opened in the median line for tuberculosis of the tubes.)

(c) This attempted spontaneous closure was often very apparent in the congenitally patent processus vaginalis in which a thickened ring at its supper end was a common discovery at the time of the operation; and was frequently noted in operations on boys in their teens and men even of sixty years of age with only recently developed herniæ.

Lastly, the complete closure of the patent processus vaginalis may occur in infancy at both its parietal and tunica vaginalis ends, with

so-called spontaneous cure, the processus either remaining empty or becoming filled with fluid to form a *congenital hydrocele of the cord* or a second acquired hernial sac forming above the processus, spread it out so as to give the impression of a double acquired sac. (The congenital hydrocele of the cord or patent fluid filled processus was often dissected out whole, being frequently separate from the parietal peritoneum above and the tunica below, while the acquired hydrocele is always continuously united to the peritoneum above.)

While the recent sac was usually like the rest of the normal parietal peritoneum, old chronically changed sacs were often markedly thickened, sometimes grayish, especially if the (quack) "injection cure" had been tried; in which case it occasionally contained in its walls plugs of paraffin or patches of scar tissue, sometimes with brownish or yellow spots due to hemorrhage; also strings of adhesions often attached the sac to the hernial contents, or the contents to each other, either generally or in spots. Lime salts deposits occasionally reported as present were not noted.

The visceral contents of the hernial sac in my cases naturally varied, *e.g.* (a) the hernial sac with either narrow or wide opening at the neck was, though large, very frequently found empty at the time of the operation. In cases of ascites the otherwise empty sac might be expected to fill with fluid, especially on standing. One such case with tubercular peritonitis was recently operated by Dr. Victor L. Schrage at the Presbyterian Hospital, Chicago.

(b) The usual contents of a hernial sac were: (1) the omentum alone (epiplocele) especially commonly found in large herniæ of long standing with but few symptoms, though irreducible. (2) Littre's hernia, *i.e.*, where only a part of the circumference (convexity) of the intestinal wall protrudes through the narrow sac neck into the usually small hernial sac was not encountered but occurred in the service of some of my colleagues. The writer when an interne in Cook County Hospital had the privilege of seeing the autopsy by Dr. Hektoen, Pathologist of Rush Medical College, on a deceased man with a typical Littre's inguinal hernia. The patient had entered the hospital with the symptoms of a very acutely strangulated hernia and expired early in chloroform anesthesia due to an interstitial myocarditis.

(3) The small intestine was most frequently found intrasac. The duodenum and upper part of the jejunum being attached high up, fixed and short mesenteried, are naturally but rarely herniated, while the low attached and usually very long mesenteried and small ileum was the most often; and slightly less often the lower part

of the jejunum, either alone (enterocele), or with the omentum (enteroepiplocele). (Meckel's diverticulum was not encountered.)

Nonsupport and the traction on the herniated intestine probably also caused the mesentery to occasionally become markedly increased in length.

(4) The flexure sigmoidea which becomes herniated (especially on the left side) the most frequently of the large intestines, due to its often extremely long mesentery, one might also expect to find not infrequently in right-sided herniæ.

(5) The cecum and vermiform appendix are despite their usually absent or short mesentery occasionally reported as being found in right-sided herniæ, due either to the cecal mesentery being unusually long, and allowing the cecum to hang low down into the true pelvis or it perhaps is more often lengthened and drawn into the hernial sac by traction of an already herniated ileum.

In these latter cases the cecum and the ileum both lie within the sac, while in the (sacless) cæcal inguinal herniæ due to parietal peritoneum sac traction (para-sliding) of the enlarging hernial sac, the herniated, *e.g.*, small intestine only, lies within the sac, the bared cecum lying outside of the sac, forming (as previously mentioned) a part of the sac wall.

Tuffier's cecal herniæ were 42 inguinal, 6 femoral and 5 umbilical.

When we consider the frequency of visceroptoses we can understand why even transverse colon and part of the stomach are occasionally reported as encountered in the lower herniæ.

(6) In rare cases a large part of the bladder may be herniated, either intraperitoneally (intrasac) or sliding, extraperitoneally (extrasac) in direct inguinal herniæ. Three of the latter occurred among the writer's cases, one bladder being accidentally opened but healed per primarum as did also the hernia.

The ovaries which often drag with them the Fallopian tubes and in rare instances even the uterus into the sac, as well as the (usually right-sided) floating kidney and ureter, deserve passing mention as occasionally having been reported as being found herniated.

The size of the herniæ is interesting. One enormous inoperable irreducible umbilical hernia in a hard-working Jewish woman was so large as to almost amount to eventration, *i.e.*, most of the small and large intestines, the stomach and even perhaps a part of the spleen and liver were probably within the hernial sac. Enormous scrotal (oblique or direct inguinal) herniæ were less frequent though not uncommon among the men operated successfully by the writer, three of which reached almost to the patient's knees.

In considering the operation on large irreducible herniæ of long standing it should be remembered that the intraabdominal cavity proper becomes gradually lessened in cubic capacity, and the normal part of the abdominal walls proportionately shortened, *i.e.*, the herniated intestine and viscera lose their space intraabdominally, concentrically as it were, so that reduction and closure at the time of the operation may be difficult or even impossible. Besides the lessened cubic capacity of the abdominal cavity there was also often hypertrophy and increased length, and distention of the intestines proximal to the hernia, to say nothing of the often enormously elongated mesentery and omentum. A prolonged preparation by elevation of the hernia while resting in bed, with soft diet and repeated enemata often assisted in rendering large herniæ more operable.

The behavior of the reducible herniæ (in the writer's cases) varied considerably, either they were (a) spontaneously reducible, especially when small, that is, the herniated gut passed back into the abdominal cavity spontaneously immediately the excessive intraabdominal pressure was relieved, or at least when assuming the dorsal decubitus position.

Small herniæ were often not visible to inspection or even demonstrable by impulse when the patient was lying down, but only when standing, and perhaps then only during a very marked increase of the intraabdominal pressure, as by violent coughing. After a few days in bed, *e.g.*, in leg fracture cases with reduced herniæ, the interne in his rounds would often only by repeated examinations be able to at most make out a very slight bulging, in cases in which later at the hernia operation one often encountered a very large empty sac from 7 to 10 cm. long, which corroborated the patient's history as to the size, and even sometimes presence which till then had been doubted.

This apparent absence may possibly have been due to the enormously hypertrophied cribriform muscle so often encountered, also the occasionally extremely thick deep layer of superficial fascia which in one case operated in consultation with Dr. Arthur M. Bishop was far thicker and more resistant than the usual external oblique fascia.

(b) The hernia in other cases with wide sac necks "came down" immediately the patient stood up or sat up, or even when lying down if coughing, but was easily reduced again by the patient, who often had become quite expert in reducing it by taxis.

(c) Other apparently irreducible cases were doubtless reducible

by expert taxis during Nelatonisation and anesthesia, but naturally in hospital life with the conveniences for operation it was comparatively rarely tried, either by myself or the internes; indeed, the instruction in *redux by taxis* is all too much neglected when we consider that it has often to be done when the conveniences for operation are not at hand, or when ether and chloroform are contraindicated as they often are nephropathically or cardiopathically, especially in patients of advanced years and often high blood pressure.

In these latter cases a hypodermic of morphine and atropine and expert taxis with the patient in the Trendelenburg position would often succeed if tried early enough, but due to neglect of this, one is often forced to do a radical operation, the conditions for which are too poor to expect a successful outcome. The bad reputation surgery gets from such deaths often makes many really operable cases refuse operation till too late.

In many cases where taxis utterly failed, it was not uncommon to have the hernia reduce itself spontaneously as soon as the patient was anesthetized and relaxed.

Operations occasionally revealed the fact that irreducible or incarcerated herniæ remained for days, or even weeks in a safe condition to have attempted taxis, though usually the firm adhesions at the sac neck would have rendered bloodless reduction impossible.

The really strangulated hernia should only be subjected to taxis attempts immediately after strangulation for a few minutes and then only in the absence of conveniences for operation or in cases in too poor a condition for a general anesthetic; taxis failing, immediate operation should be insisted on, as it should also be later even if successfully reduced, always provided there be no (bronchial, renal, or cardiac) contraindication when local anesthesia should always be employed.

In performing taxis the rings should be relaxed as much as possible by flexing the limbs and ad- or abducting and rotating while the patient is in the dorsal decubitus with the chin well flexed on the sternum (Malgaigne) or on the healthy side, or in Nelatonisation. In inguinal herniæ Le Fort advised limb flexion combined with abduction; in femoral herniæ, flexion, adduction and inward rotation. If alone, the author has found that by placing the patient's leg (of the side of the hernia) over the operator's shoulder, that one can manipulate the limb as desired, leaving both hands free for taxis. The rule to reduce the part of the hernia nearest the ring, first, *i.e.*, in the inverse way of its occurrence should be rigidly adhered to.

Grasp the base of the hernia as near the neck as possible, try to loosen it by slowly and cautiously drawing on and manipulating it from side to side; then by an all sided "basal" pressure with the fingers of both hands, try to reduce the neck of the herniated bowel through the ring.

If gas begins to pass from the herniated into the intraabdominal intestine, the reduction in size is soon apparent, and the bowel itself (if nonadherent at the neck) may follow with the characteristic gurgling sound. The safest sign that taxis has succeeded in true reduction is, that the hernia not only disappears so that the fingers can detect the free rings, but that all the symptoms entirely subside also. That the danger of "false redux" by taxis (probably very much more frequent than recorded) is very great, is easily understood when we recall the possibility of plastic or connective-tissue adhesions between the sac neck and the bowel, or indeed in the absence of these the thick rigid interadherent sac neck folds, together with an easy detachability of the paraperitoneal tissues and perhaps stretching of the parietal peritoneum itself.

A case of "*en masse*" para-peritoneal reduction in a moribund condition was brought to Cook County Hospital in November, 1912. The autopsy by Dr. LeCount revealed the false reduction and peritonitis as the cause of death. By rough taxis the neck of the hernial sac may become torn from the body of the sac, and the herniated intestine though reduced be still surrounded and strangulated by the thick ring-like neck. The "*en masse*" reduction may not be complete and the hernia still lie partly in the opening and can be felt there. In this the deception is not so pronounced. Taxis for reposition of a hernia is said also to sometimes cause axis twisting or invagination of the bowel.

The symptoms of strangulation continuing after apparently successful reduction, radical operation should be performed at once.

Lastly taxis may cause trauma, thrombosis or even tearing of a friable strangulated infiltrated intestine followed by lethal peritonitis. The advice for selection of cases, early and brief trial, and avoidance of undue force, cannot be too strongly emphasized.

The subjective symptoms of reducible herniæ varied very much, from complete absence to slight digestive disturbance, constipation, slight discomfort, or localized pain at the hernia site either when at rest or only on exertion.

Colic, perhaps due to dragging on the mesentery, or omentum, or parietal peritoneum, was occasionally marked, especially after indigestible food was eaten. Lifting, or carrying weights, and long

walks were often complained of as very distressing or even impossible.

In some small (easily) reducible herniæ the subjective symptoms were quite marked, while in some larger reducible, or even irreducible (incarcerated) herniæ they were apparently but slight.

The Objective Symptoms of Reducible Hernia.—Palpation while standing usually elicited a soft elastic often tympanitic hernial enlargement giving impulse and often increased visible bulging on coughing. If reduced one could often depress the outer hernial coverings and feel a distinctly thin place, often with a sharp outlined (fascial) border or ring through which the fingers could partially invert the overlying thinned abdominal wall into the abdominal cavity.

The prognosis of hernia, however small, and however easily reducible, is always grave. While a spontaneously reducible, or reducible by taxis hernia of small size may remain stationary for months or even years, it usually increases in size more or less rapidly under the intraabdominal pressure centered at that point and may become irreducible or suddenly strangulated at any time. (a) *Simple irreducibility or incarceration alone* (in which neither the passage of feces through, nor the circulation in the blood-vessels of the herniated intestine is obstructed), was more common in the abnormally wide-ringed oblique and direct inguinal and umbilical and ventral herniæ, where the sac neck was comparatively short, than, *e.g.*, in the narrow-ringed oblique inguinal and femoral hernia where the sac neck was longer.

The adhesions so common in incarcerated herniæ at the (sufficiently wide) neck are often really a partial safeguard, tending to prevent more intestines from suddenly gaining entrance to the sac and becoming strangulated, though this always is a possibility. Old incarcerated umbilical herniæ even of very large size were often borne for years with but the few symptoms due to becoming larger and gradually harder when filled to the maximum with gas and feces. Experience teaches the necessity of a detailed description of the behavior of the incarcerated herniæ.

External friction or traumata in these cases (unless adequate protection is given by a shield) may cause abrasion and infection of the outer hernial coverings (as occurred in one of the writer's cases), *and even the sac become infected from without*, or indeed, opened by trauma with prolapse of the herniated intestines, or even rupture of these and anus preternaturalis.

The chronic stagnation of feces in the incarcerated, herniated

intestinal loop, predisposes to mucosa muscularis infection, which may occur at any time *spontaneously within the bowel* with an increase in the quantity, clouding, later purulent and often stinking condition of the sac fluid, and infection and suppuration of the sac and indeed some of the outer coverings by the time the strangulation symptoms have become pronounced.

In some cases thrombosis was apparently primary and sudden necrosis and perforation of the incarcerated intestinal wall occurred seemingly without sufficient strangulation at the neck.

Probably less often the primary infection apparently passed from the bowel via the almost constant adhesions at the pleated sac neck, which became rapidly infiltrated and thickened, and the neck opening increasingly narrowed in consequence, with more or less rapid neck strangulation and necrosis of the herniated intestine.

Extension of intrasac infection (by rupture through the adhesions at the sac neck) to the general peritoneal cavity, with lethal diffuse peritonitis, was common in neglected cases before or at the time of the operation.

(b) *Sudden recent acute nonreducibility and strangulation* of apparently innocent reducible herniæ (usually recognized at the operation by the clear serosanguinolent sac fluid and by being devoid of adhesions at the sac neck) was common.

There were as many patients that gave no history of sudden violent exertion just previous to the strangulation as those that did; indeed, strangulation not uncommonly occurred suddenly during the night while lying quietly in bed.

Possibly looseness of the parietal preperitoneal (para) tissues (especially in visceroptotic multiparæ) may have allowed easy sliding and enlargement of the sac, or partly due to some unusual intraabdominal pressure, cough or sneezing or an unusually lively (indigestion) peristalsis, or both; a length of intestine and width of mesentery suddenly gained entrance to the sac, of such large size that at its neck, obliteration of the herniated intestinal lumen, and strangulation of the vessels, was immediately brought about, with a rapid accumulation of sac fluid, or possibly undue traction on the intestinal mesentery with acute knicking of the veins occurred, causing acute engorgement "wandering through" and secondary inflammatory infiltration and rapid thickening of the herniated intestine walls, or an acute primary intestinal vessel thrombosis, was the cause of the sudden so-called strangulation changes.

The rapid accumulation of sac fluid by increasing the pressure on the herniated intestine apparently also increased the kinking and strangulation.

Staphylococci, streptococci, and bacilli coli communis have been reported present in sac fluid even before any marked macroscopic changes appeared, probably accounting for some of the inexplicable infections following clean herniotomies.

The observations of Tietze who found bacteria fifteen times in fifty-two cases, are interesting. In contradistinction to this, bacteria were occasionally absent when the gut was almost gangrenous, making it appear as if hernia sac fluid possessed bactericidal action in some cases.

The theories of intestinal lumen obstruction from the simple kinking of the distal loop (Chassignac), to the gut mucosa-folds wedge at the neck (Kocher), are unimportant compared to the hindrance to blood circulation and inflammation or thrombosis.

The changes in a strangulated bowel wall, differ widely; from the simple engorged, strangulated intestine of a deep or brownish blue or reddish brown to the completely black of actual necrosis demanding resection.

(a) Gradual strangulation leads to firm adhesions at the sac neck and retention of the infection within the sac.

(b) Sudden strangulation (if there be no preformed adhesions at the neck) by the sudden engorgement of the bowel and a very rapid "wandering through" infection, hinders adhesion formation, so that the infection immediately may invade (by continuity) the general peritoneal cavity with resultant diffuse lethal general peritonitis often already far advanced before the operation.

(c) Intrasac strangulation of large mesenteric vessels whose branches supply the immediately proximal or distal nonherniated intestine or thrombosis occurring in the herniated gut, the changes from which, may or may not yet be apparent, may have already extended to the nonherniated mesenteric vessels, thereby giving rise to intraabdominal dangers of gut necrosis which we are often not in a position to judge by the mere hernial contents themselves, or indeed through the hernial operation opening at the time of the operation.

This fact should always be carefully borne in mind even in cases which, according to the history, are supposedly operated at the very onset of strangulation; as these hidden lesions in the intraabdominal intestines and peritoneum, may be far more dangerous than those within the hernial sac.

The changing (reasonably rapidly) to a pinker hue after the release of the strangulation though a better sign than that of mere color alone, is never a certain index of the integrity of the circulation, indeed were it not for omental adhesions occurring after reduction and the "*omental adhesion vessels*" supplying nourishment to the injured bowel many more of these cases would result fatally than do.

Hernia strangulation was usually accompanied by violent pain, later signs of intestinal obstruction, obstipation, and more or less shock, vomiting first of the stomach contents, later fecal, later very pronounced shock and markedly frequent pulse.

The subjective symptoms do not, if we take the average patient's history, indicate necessarily the condition in which we shall find the herniated and nonherniated bowel at the time of the operation, as the history of the case is often wholly unreliable.

The frequent neglect of strangulated herniæ from hour to hour often for days clearly demonstrated the need of rehearsing constantly to the profession the want of prompt operation if lives are to be saved.

Ileus symptoms that begin early and increase rapidly in severity are often the safest, because the acute alarm they cause forces the doctor to institute, and the patient to submit to, prompt radical measures than does strangulation with a more insidious onset. Despite the visible hernia, the constipation, the rigid abdominal walls and fecal vomiting that should warn both the laity and the profession, the old adage "every hernia patient wears a shroud" becomes more expressive as one's experience widens.

PEOPLE'S GAS BLDG., CHICAGO.

THE MORTALITY IN CESAREAN SECTION.

BY

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(With three charts.)

IN reviewing the history of this ancient operation, Cesarean section, it is interesting to note the steps of progress leading up to the modern procedure which is to-day so frequently and successfully performed. Prior to the last quarter of the nineteenth century, the mortality was so great that it was only performed for an absolute indication, and even then usually as a *dernier resort*. Radford, in 1880, collected the records of 131 cases of the work of operators in Great Britain and Ireland, and found a mortality of 78 per cent. Harris, in 1878, collected eighty cases operated upon in the United

States. This report showed a mortality of 52.5 per cent. The high mortality was chiefly due to infection and hemorrhage from the uterine incision, which was at that time not sutured. Then, too many cases were operated upon, doomed already to death through their exhausted condition brought about by long labor or previous surgical interference.

The writers of that period appreciated just as much as we do to-day that the tired out, exhausted patient and the case examined frequently was not a good subject for operation. Harris found that in seventeen selected cases operated upon during or at the close of the first day, 73 per cent. of the women lived, and that in all of these cases but one the child was born alive. In 1876 Porro advised the amputation of the body of the uterus and stitching the cervical stump into the abdominal wound in order to lessen the danger from hemorrhage and infection.

The most important period in the history of the progress of this operation, however, was in 1882, when Sanger advised the employment of uterine sutures. As the uterus was not sacrificed by this operation, it was designated as the conservative, in contradistinction to the Porro operation, which necessitated the removal of the uterus. From this date gradually, through better methods of operating, better selections of cases and the appreciation of surgical cleanliness, the mortality began to rapidly improve, and with this the indications for the operations have been rapidly increasing. It is now resorted to more and more for the relative indications, and by many Cesareanists the child's life alone is a justifiable indication. To-day the mortality is as low as 2 per cent. in clean cases. Many operators have reported a long series of cases without a death. Routh, in 1910, collected 1282 cases of Cesarean sections performed in Great Britain. He showed that there had been a gradual decrease in the mortality and that at present, in favorable cases, it was from 2 to 4 per cent. Leopold, in 1910, reports sixty-four conservative sections without maternal or fetal mortality. In a series of 300 sections for various conditions, his clinic reports a maternal mortality of 4.2 per cent. Kouwer has performed sixty sections upon patients in good condition without mortality. Davis, E. P., had a series of seventy cases in good condition when operated upon, with no maternal death, and Zweifel recorded seventy-six sections with one death. Boyd, in 1911, reports twenty-seven cases with no deaths. The low mortality for Cesarean section to-day is one of the greatest triumphs in surgery. The satisfactory results are only found in cases operated upon in good or fair condition. When, however, the patient is infected or

exhausted from her labor, then the mortality is high; thus, Reynolds studied 289 cases in this regard. He divided them up according as the operation had been performed before labor, or early or late in labor, and found a mortality of 1.2 per cent., 3.8 per cent., 12 per cent. respectively. Routh found that the general mortality for all indications was 11.6 per cent.

The writer of this paper desires to report twenty-one Cesarean sections and to supplement this with twenty-seven cases already reported. The forty-eight cases represent his entire experience to date with the operation. He desires to briefly review his cases, and to use this series as the basis of his remarks.

CASE XXVIII.—Rachitic, flat pelvis. Absolute indication. Mrs. S., referred by Dr. Tunnell, was admitted to the Medico-Chirurgical Hospital, February 1, 1911. She was a negress, born in the United States. Her age was twenty-two years, and for the first time pregnant. Her menstrual history was normal in type. She had her last period May 15, 1910, and her labor was expected February 22, 1911. The patient was found to be in the last month of gestation and her pelvis markedly contracted. The following measurements were made: Interspinous, 22 cm.; intercrystal, 22 cm.; external conjugate, 16.5 cm.; true conjugate, 7.25 cm. The head was presenting but freely movable above the pelvic brim. The great degree of contraction warranted elective Cesarean section which was performed February 13, 1911, for the absolute indication. An abdominal incision 15 cm. in length was made, extending 5 cm. above the umbilicus. A longitudinal incision in the uterus 12 cm. revealed the placenta in an abnormal, anterior position. This organ was separated on one side, the membranes were ruptured and a male infant weighing 3680 grams was rapidly delivered. The placenta was next removed, as there was no dilatation of the cervix, a manual dilatation was accomplished by forcing the finger through the internal os to the vagina. The uterine incision was closed with fine silk interrupted sutures at intervals of about 1 cm.; a second row of superficial sutures was inserted to bring the peritoneum into apposition. The patient made a good recovery and was discharged with her vigorous infant March 4, 1911, three weeks after the operation.

CASE XXIX.—Flat pelvis. Exostosis at promontory of sacrum. Repeated Cesarean. Mrs. B., white, born in Germany, was admitted to the Medico-Chirurgical Hospital March 10, 1911. She had been married three years. Her menstrual history began at the fourteenth year. The flow was scanty but regular in type, lasting three days. Her first labor occurred eight years ago, was prolonged, but her child was born alive. Her second child was born two years ago. In this pregnancy Cesarean section was found necessary because of the deformity of the pelvis. On admission to the hospital the patient proved to be near term, having had her last menstrual period June 22,

1910. The pelvic measurements were as follows: Interspinous, 24 cm.; intercrystal, 27 cm.; external conjugate, 17 cm. The head was presenting, but not engaged. Fetal heart distinctly heard. With the history of the previous difficult labors, Cesarean section was repeated. Operation was performed March 13, 1911. An incision 15 cm. was made to the side and parallel with the old scar. This incision revealed uteroabdominal adhesions. These adhesions were not disturbed. A longitudinal incision was made in the uterus, extending to the fundus. A female child, weighing 4500 grams, was delivered. The uterus was repaired by the use of fine silk through-and-through sutures. The patient made an uneventful convalescence and left the hospital with her infant March 27, 1911.

CASE XXX.—Labor obstructed by ventrofixation of the uterus. Mrs. T., referred by Dr. Saltmarsh, was admitted to the Medico-Chirurgical Hospital April 6, 1911. Her age was thirty-three years, born in England, and pregnant for the fifth time. Her first three labors were normal. In February, 1907, an anterior fixation operation was performed for prolapse and retrodisplacement of the uterus. From this operation she made a good recovery. In September, 1908, her fourth child was born, one and one-half years after the operation. This labor was in no way complicated. Her fifth pregnancy began July 12, 1910. She states that she had been in ill health throughout her gestation, and had considerable pain in the abdomen, and as she approached term had a threatened premature labor. The patient was admitted in labor. Upon examination, it was found that the inlet of the pelvis was obstructed by the much thickened and hypertrophied anterior wall of the uterus. It was difficult to reach the cervix and the child was found in a transverse position. Fetal heart could not be heard. Cesarean section was performed April 7, 1911. Upon opening the abdomen, a firm band of adhesion fixed the uterus to the anterior abdominal wall. Her pregnancy had advanced at the expense of the freed portion of the uterus which had become very much thinned out. The band of adhesion was liberated, a longitudinal incision made in the uterus, and a dead child extracted. The uterine incision was closed in the usual manner, using fine silk. The patient left the operating room somewhat exhausted, and for several days had an elevated temperature. She, however, soon began to improve and continued in an uninterrupted convalescence. Was well enough to leave the hospital April 29, 1911.

CASE XXXI.—Coxalgic pelvis. Outlet contracted. Mrs. M., white, aged nineteen years, and born in the United States, was referred to the Medico-Chirurgical Hospital June 20, 1911. Her general health was good until her sixth year, when following a fall from a wagon she began to complain of pain about the hip-joint. Was two years under treatment at the Presbyterian Hospital of Philadelphia. Her menstrual history began at the fourteenth year. Normal in type. She had her last menstrual period October 6, 1910. On admission the patient proved to be near the end of gestation. The pelvis was obliquely deformed and a double ankylosis of

the hips necessitated the use of crutches. A marked deformity of the pelvis warranted elective Cesarean section, which was performed July 7, 1911. The child, a female, was delivered in good condition. Its weight was 4140 grams. The patient made a good recovery and was discharged from the hospital, July 24, 1911.

CASE XXXII.—Generally contracted pelvis. Mrs. D., white, born in Russia and aged twenty-eight years, was admitted in labor to the Medico-Chirurgical Hospital July 20, 1911. She was in her second pregnancy. The first child was delivered by Cesarean section two years previous to admission. Her menstrual history began at the thirteenth year and was normal in duration. She had her last period October 12, 1910, and her labor was expected July 15, 1911. With a history of previous Cesarean section and the existence of marked contraction of the pelvis, a repeated section was advised. The operation was performed July 20, 1911. Although the patient had been in labor ten hours when operated upon, her condition was good and the fetal heart distinctly heard. Upon opening the abdomen, uteroabdominal adhesions were found. As they were not extensive and did not interfere with the second uterine incision, they were not liberated. Her infant weighed 3220 grams and was in fair condition when delivered. The postoperative course was without special interest. The mother and infant were discharged August 5, 1911, both in good condition.

CASE XXXIII.—Generally contracted pelvis. Mrs. P., born in the United States, thirty-one years old, and pregnant for the first time, was admitted to the Medico-Chirurgical Hospital, November 5, 1911. The patient's general history was good, but she was slightly under size. Internal examination found the head presenting, but high in the pelvis. She went into labor Nov. 4, 1911, but made little progress. As her pelvis was only contracted to a moderate degree, she was given a cautious but not prolonged test in labor. At the expiration of twenty hours, the head failing to advance, Cesarean section was suggested. This operation was performed November 5, 1911. Although she had had a good labor test, the patient was in good condition and the fetal heart sounds quite audible. The abdominal incision was 12 cm. long, having the umbilicus as a central point. A longitudinal incision was then made in the uterus without evertedness of the organ. A male infant, weighing 4140 grams was delivered in vigorous condition. The uterine contraction was satisfactory; hemorrhage slight. Through and through silk suture was used, starting in the serosa and carried through the muscle to the decidua, reversing the procedure on the opposite side. These sutures were placed at intervals of about 1 cm. A second row of sutures of finer silk was inserted superficially to bring well together the peritoneum. The patient's convalescence was without special interest except for a little pain, and she soon began to nurse her infant. Mother and baby left the hospital December 5, 1911, fully recovered.

CASE XXXIV.—Generally contracted rachitic pelvis. Mrs. P., aged eighteen years, occupation housework, was admitted to the Phila-

delphia General Hospital, April 7, 1912. Her father was dead, his age and cause of death unknown. Her mother's age was thirty-eight living and well. As a child, the patient had the usual acute affections, scarlet and typhoid fever. Her menstrual history began at the fifteenth year, has always been regular and painless, lasted about one week. This is the patient's first pregnancy. She has been in good health and has had no headaches; some difficulty in digesting food. She had her last menstrual period July 17, 1911. The patient's general condition seems good. She is, from her size, in the last month of gestation. The head is presenting but not engaged. The following measurements of the pelvis are made: Interspinous, 22 cm.; intercrystal, 24 cm.; external conjugate, 17 cm.; true conjugate, 7 cm. Celiohysterotomy was performed April 6, 1912. Incision was made in the median line from the umbilicus to the pubes. Next, a longitudinal incision was made through the anterior uterine wall. Her child was somewhat asphyxiated when delivered, but was soon resuscitated. The patient had a normal convalescence and was discharged from the hospital with her infant, May 28, 1912.

CASE XXXV.—Funnel pelvis. Mrs. B., a primipara, aged twenty-seven years, born in Russia, a housewife by occupation, was referred to the Medico-Chirurgical Hospital by Dr. Leof on April 29, 1912. She had always been in good health. Her first menstruation had occurred at twelve years. She had her last menstrual period July 6, 1911, and the date of her confinement was fixed for April 20, 1912. On examination, the patient was found to be pregnant at term and beginning to show signs of prolonged labor. The abdomen was somewhat pendulous on abdominal palpation; the fetal ovoid could be easily outlined. The head was found at the brim of the pelvis and fixed, and the dorsal plane of the ovoid was felt on the left side. A study of the pelvis showed a general contraction resembling the male pelvis with the outlet markedly contracted. After twenty-four hours' labor without progress, section was performed. Celiohysterotomy was performed April 29, 1912. The infant, a female, weighing 3680 grams, was delivered in good condition. The patient made a good recovery, and left the hospital May 19, 1912, with her infant.

CASE XXXVI.—Generally contracted pelvis. Elective. Mrs. G., a negress and primipara, aged nineteen years, American, was admitted to the Medico-Chirurgical Hospital November 11, 1912. She had had her last period March 1, 1912, and her labor was expected December 7th. On admission she was found to be pregnant near term. The following measurements were made: Interspinous, 23 cm.; intercrystal, 25 cm.; external conjugate, 17 cm.; conjugate vera, 7 cm. The head presented but was movable above the pelvic inlet and stood out prominently, bulging over the pelvic brim. With the existence of so marked a contraction, the electing sections for the absolute indications existed. Celiohysterotomy was performed November 25, 1912. A male infant weighing 2990 grams was extracted in good condition. After the removal of the placenta, a

manual dilatation of the cervix was made by slipping the finger gently through it into the vagina. This course has usually been followed in the elective case, and is without danger, provided careful disinfection of the vagina is made prior to operating. The mother and infant progressed favorably and left the hospital on December 16, three weeks after the operation.

CASE XXXVII.—Funnel pelvis. Mrs. B., a multipara, aged twenty-four years, and born in the United States, was admitted to the Medico-Chirurgical Hospital on February 11, 1913. (Referred by Dr. A. P. Berg.) She had had two previous deliveries; each labor was long and ended in the birth of a dead child. Her menstrual history was normal. The pelvic measurements were as follows: Interspinous, 24 cm.; intercrystal, 26 cm.; external conjugate, 18 cm.; true conjugate, 7.5. On internal examination the head is found presenting. Taking into consideration the history of her previous labors which had ended disastrously to the child and as the contraction of the pelvis was marked, an elective celiohysterotomy was done February 12, 1913. The infant weighed 4320 grams. The patient made a rapid convalescence, and left the hospital with her infant February 26, 1913, fully recovered.

CASE XXXVIII.—Contracted pelvis and prolapse of the funis. Mrs. B., aged twenty-two years, a negress and a primipara, was admitted to the Philadelphia Lying-In Charity, February 14, 1913. Her menstrual history began in the sixteenth year, regular in type. She had her last period May 10, 1912. This period was five days in duration. The patient is small in stature, but in good general health. The following pelvic measurements were made: Interspinous, 23 cm.; intercrystal, 24 cm.; external conjugate, 18 cm.; true conjugate, 8.5 cm. She went into labor in the evening of February 15. After a test of ten hours, the membranes ruptured and this was followed by prolapsing of the funis. This unexpected complication prompted immediate action. Operation was performed February 16, 1913. An abdominal incision 15 cm. long was made with the umbilicus as a midpoint. Next a longitudinal incision was made in the uterus. This incision was as usual closed with fine silk interrupted sutures. The patient had slight abdominal distention after the operation, due to gas. This was relieved by an enema of turpentine. Her subsequent convalescence was satisfactory in every respect, and she was discharged from the hospital with her infant March 4, 1913.

CASE XXXIX.—Funnel pelvis. Mrs. X (referred by Dr. Zoll), was admitted to the Medico-Chirurgical Hospital on the evening of March 15, 1913. She was a primipara, aged twenty-three years, born in the United States. Her menstrual history was normal. She had her last period June 15, 1912, and was now at term and already fifteen hours in labor. The patient is very corpulent and the pains futile. Internal examination reveals the head very high, the membranes are ruptured and a pronounced outline is felt. Her pelvis is the typical narrow funnel pelvis, with a much contracted outlet. A few hours after her admission, the delay occasioned by

the preparations of the patient, section was performed at 12.30 A. M. March 16, 1913. Her infant weighed 3220 grams. Was in good condition. The patient complained for several days of abdominal pain due to gaseous distention. It then disappeared and the subsequent history postoperative was without special interest. Mother and baby left the hospital April 3, 1913.

CASE XL.—Generally contracted pelvis. Exostosis at promontory. Mrs. K., was admitted to the Philadelphia General Hospital March 6, 1913. She was thirty years old, born in Russia, and her sixth pregnancy. Her previous labors had been instrumental. Has been married ten years. Her menstrual history began at fifteen years old, always regular, continuing for three days as a rule. She had her last period July 15, 1912. Pelvic measurements were: Interspinous, 23 cm.; intercrystal, 23.5 cm.; external conjugate, 17 cm.; conjugate vera 7.5 cm. The patient went into labor May 11, 1913, but made no progress after a test of fourteen hours. Celiohysterotomy was performed May 12, 1913. The uterine incision revealed the presence of the placenta; this was separated from its attachment on the left side, and the infant extracted. It was in good condition, weighing 3250 grams. The mother and infant made a good recovery and were discharged from the hospital June 4, 1913.

CASE XLI.—Rachitic pelvis. Repeated section. Mrs. B., aged twenty-two years, black, a para ii, born in the United States, was admitted to the Philadelphia Lying-In Charity, April 29, 1913. She began to menstruate at her fifteenth year, always normal in type. She had a Cesarean section two years ago. Her last period was October 7, 1912, and her labor was expected July 7, 1913. The pelvis was markedly deformed, demanding a section for the absolute indication. Elective celiohysterotomy was performed June 27, 1913. A median incision was made in the old scar below the umbilicus. This revealed numerous uteroabdominal adhesions which were broken up. The child, a male, weighing 3220 grams, was delivered in a healthy condition. The uterine wound was repaired in the usual manner, using interrupted sutures of fine silk through and through. The convalescence was uneventful and mother and infant left the hospital July 15, 1913, in good condition.

CASE XLII.—Rachitic pelvis. Repeated section. Mrs. J., Hungarian, aged forty years, and in her second pregnancy, was admitted to the Medico-Chirurgical Hospital, November 23, 1913, as an emergency case, already twenty-four hours in labor. She had had four previous labors, all difficult; two forceps deliveries, one craniotomy and one Cesarean section. Her pelvis was obliquely deformed. Interspinous, 25 cm.; intercrystal, 26 cm.; external conjugate, 16.5 cm.; conjugate vera, 7 cm. Although she had been in labor some time and a tentative forceps operation had been performed before admission, her condition was fair and the fetal heart sounds heard. Celiohysterotomy was performed as soon as preparations could be made, November 23, 1913. Abdominal incision made to the side of the old scar. Omental adhesions were found which

were broken up. The uterine incision extended to the fundus. The infant was delivered rapidly. It was asphyxiated, but was soon resuscitated. Mother and infant made a good recovery and left the hospital December 8, 1913.

CASE XLIII.—Funnel pelvis. Mrs. B., aged thirty-five years, a primipara, born in Ireland. I saw her in consultation with Dr. Missett on November 26, 1913. She had been in labor all day and had made little progress. Her pains at first were strong, but later grew weak and inefficient. When I saw the case in the evening I found the patient of normal size, but the pelvis resembled the male type. Examination of the patient showed that the child was large, and that the head was high. The cervix was dilated and the membranes ruptured and there was beginning to form a caput succedaneum. The dorsal plane of the fetal ovoid was outlined on the left side and the fetal heart sounds distinctly heard. As the patient had now been already sixteen hours in labor, and as she was anxious for a living child, Cesarean section was considered the advisable course to follow. She was immediately admitted to the Medico-Chirurgical Hospital, and after the required preparations were made, celiohysterotomy was performed. The child weighed 3680 grams. The patient made a rapid convalescence and mother and baby were discharged from the hospital December 10, 1913.

CASE XLIV.—Cesarean section for eclampsia. Mrs. W., white, aged thirty-four years, and a primipara. I saw her in consultation with Dr. Mulford of Burlington, N. J., on January 12, 1914. Shortly before my arrival she had been suddenly taken with an eclamptic convulsion of a pronounced type. This convulsion was soon followed by a second just as severe. The patient had reached the completion of the eighth month of gestation. The fetal heart could be heard, but on internal examination, there was no evidence of the onset of delivery. She had been quite well until a few days before the attack, when she began to complain of headache. The urine analysis had been made from time to time during her pregnancy without revealing any disorder, but now since the convulsions an abundance of albumen is present. Cesarean section was recommended as the most expedient method of ending the pregnancy. The fetal heart was heard, the cervix was rigid, and there was no evidence of labor. The patient was removed to the Medico-Chirurgical Hospital, and Cesarean section performed January 12, 1914, ten hours after the first convulsion. The child weighed 2011 grams, and was of the male gender. It seemed, however, quite vigorous and showed no evidence of toxemia. The mother's recovery from the operation was rapid. The albuminuria gradually became less and there was no recurrence of convulsions. The mother and infant were discharged from the hospital February 2, 1914.

CASE XLV.—Pelvis transversely contracted. Albuminuria. Mrs. C., Philadelphia Lying-In Charity, September 10, 1913. She was thirty-six years old, born in the United States, and a housewife by occupation. She had the usual diseases of childhood. Her men-

strual history began at the fourteenth year, and was normal in character. The patient is pregnant for the first time. Her last menstrual period was March 31, 1913. Examination of the patient on January 1, 1914, showed that her infant was large, and that there existed a transverse contraction of the pelvis. It was also noted that she had an edema of both ankles and headache for some time. Complains of loss of appetite, but no eye symptoms obtainable. The patient also complains of pain in the lumbar region. She is much below the normal in height, measuring 4 feet, 5 inches. Her eyes revealed an exophthalmos. Pupils are equal and react. Skin is pale and sallow. There is no enlargement of the neck. The fingers are clubbed and show slight tremor. Celiohysterotomy was performed January 17, 1914. After a complete anesthesia, a vaginal disinfection was carried out by the use of green soap and a bichloride solution. The abdomen was next scrubbed by the usual method, green soap followed by alcohol, and finally wiping the field of operation with sulphuric ether. Median incision was made 16 cm. long, extending 5 cm. above the umbilicus. The uterus was not eventrated. Incision 12 cm. in length made in the anterior abdominal wall. The child, a male, weighing 2333 grams, was rapidly removed. The uterus contracted well. This was maintained by teasing it externally and the use of hot sterile water within its cavity. The cervix was manually dilated. The uterine incision was repaired by the usual method. The patient and infant made an excellent recovery, and left the hospital February 9, 1914.

CASE XLVI.—Eclampsia. Mrs. B., a primipara, white, aged thirty-one years, born in Russia, was admitted to the Medico-Chirurgical Hospital January 19, 1914. She had completed the thirty-sixth week of gestation when she suddenly developed eclampsia. She was quite corpulent, but there was no history of ill-health until a few days prior to her admission. When I saw her at the hospital on the evening of January 19, I found the patient profoundly toxic and just regaining consciousness from her third convulsion. As there was no evidence of the onset of labor, the fetal heart distinctly heard, and the patient a primipara, Cesarean section was advised; but, this of course, she and her husband refused, and an eliminative treatment was instituted which included morphia for the convulsions. She went through the night without an attack, but in the morning the convulsions returned with greater severity. The patient now seems much worse, and she did not regain consciousness between the attacks. Her husband now was anxious for us to operate. Although the patient was not in as favorable a condition for operation as when it was first suggested, Cesarean section was still considered the safest and quickest method of forcing the delivery in a primipara with a rigid cervix. Operation was performed, Jan. 20, 1914, after her seventh convulsion. Her premature infant weighed 2300 grams. No convulsions followed the operation. Her toxic symptoms, the albuminuria and headache rapidly disappeared, and both mother and infant made a rapid recovery and left the hospital February 6, 1914, in good condition.

CASE XLVII.—Carcinoma of the cervix. Mrs. H., aged thirty-three years, white, born in the United States, housewife by occupation, was admitted to the Medico-Chirurgical Hospital, January 27, 1914 (referred by Dr. Nipling). She had had two children at term, and one a miscarriage. The pregnancy for which she consulted us began May 15, 1913. She had been in ill-health throughout its course. For the past three months has had pain in the right inguinal region. December 22, 1913, she commenced to bleed, the amount varying from a slight to a moderate quantity. The patient has marked cachexia, loss of weight and strength, anorexia and insomnia. Examination made February 19, 1914, showed her to be at term. Fetal ovoid was easily outlined. The dorsal plane was found on the left side. On internal examination, a much hypertrophied, hard cervix with a crater-like excavation was felt. This examination was accompanied by a moderate amount of bleeding. The diagnosis was made of labor obstructed by rigid and indurated cervix, due to malignancy. The patient went into labor early in the morning of February 19, and the same day Cesarean section was performed. Her infant weighed 3450 grams. Mother and child made a satisfactory convalescence, and on March 19 left the hospital.

CASE XLVIII.—Generally contracted rachitic pelvis. Mrs. B., a primipara, black, aged twenty-five years, was admitted to the Philadelphia Lying-In Charity March 7, 1914, just after midnight. Her pains had just commenced. The patient was fully at term from her size. Pelvic measurements revealed a contracted pelvis. External conjugate, 18 cm. The head was presenting but not engaged and jutting out above the symphysis. She did not make progress, and at 12 o'clock noon, after a test of twelve hours' labor, March 7, 1914, celiohysterotomy was performed. The infant weighing 3250 grams, was delivered somewhat asphyxiated. The uterine incision was closed with medium silk, interrupted sutures. The convalescence was uneventful, and mother and infant were discharged, March 26, 1914, both in good condition.

The causes for which the operation was performed are as follows:

For pelvic deformity:

Generally contracted pelvis.....	14
Rachitic pelvis.....	6
Funnel pelvis.....	6
Flat rachitic pelvis.....	3
Flat rachitic pelvis with fibroid tumor obstructing labor.....	1
Scoliorachitic pelvis.....	2
Coxalgic pelvis.....	3
Obliquely contracted pelvis.....	1
Dwarfed pelvis.....	2
Justominor pelvis.....	1
Simple flat pelvis.....	1
Generally contracted pelvis with prolapse of funis.....	1
Transversely contracted pelvis.....	1

Ventrofixation.....	2	
Toxemia of pregnancy.....	1	
Eclampsia.....	2	
Carcinoma of the cervix.....	1	
		6
		—
Total		48

In reviewing these forty-eight cases collectively we find that celiohysterectomy was only once performed. It was in Case I, operated in 1896, an emergency case with a rachitic pelvis and a large fibroid of the uterus. She was forty-eight hours in labor when admitted to the hospital, was infected, and the child had been dead some time. The remaining forty-seven cases were in good or fair condition; therefore, celiohysterotomy was resorted to.

In two cases the child was dead before operation: Case I, just mentioned, and Case XXX. Here the labor was obstructed by ventrofixation of the uterus. The patient was admitted to the hospital suffering from obstructed labor, the child already dead. The fetal mortality was, therefore, 4.16 per cent. There was no maternal death. The repeated section was performed in ten cases, and twenty of the cases were primipara, and twenty-eight were multipara. In twenty-four cases elective section was performed. In eight cases there was a labor test of from one to ten hours. In fifteen cases, a labor test of from ten to twenty-four hours, and in one case the labor was forty-eight hours.

As has been stated, when Cesarean section is performed before the onset of labor, the mortality is low, perhaps 2 or 3 per cent.; but when it is performed late in labor, with a patient possibly somewhat exhausted, the mortality is high, reaching at least 10 per cent., and finally, when the operation is performed upon a patient infected, it is as high as 25 or 30 per cent.

We attribute the absence of maternal mortality in this report to the fact that, with one exception, all of the cases were in good or fair condition at the time of the operation. Thirty-four cases, 50 per cent. of the list, were operated upon before the onset of labor. In twenty-three cases there was a labor test. In some, a tentative forceps operation was done, and in one case the cord was prolapsed. In spite of these facts, all were considered good or fair risks. In only one case was the patient septic. She was admitted to the hospital as an emergency case, having already been in labor forty-eight hours. Supravaginal hysterectomy was performed. As an absolute indication for Cesarean section does not always exist in many cases coming to the surgeon, other methods of delivery must

be considered before, or early in labor. It is, therefore, essential to give some patients a good labor test, for only after such a test can the obstetrician intelligently reach a conclusion as to which case demands section and which does not.

How long a test is admissible, and what are the dangers? We have already referred briefly to the work of Reynolds in 1907 on this subject. He reported twenty-nine cases without mortality and attributes the results to the fact that the majority of operations were done before labor and that only three could, by any stretch of classification, be considered late. He was struck early by the undoubted fact that both the discomforts which his patients went through during convalescence and his own anxieties therefrom, were closely proportional to the length of labor which they had endured before operation. In his paper, "The Superiority of Primary over Secondary Cesarean Sections and the Feasibility and Advantages of a Predetermination of the Methods of Delivery," he studied 289 cases of Cesarean section, and divides them for the purpose of inquiry into three classes:

1. Primary sections; those performed before the beginning of labor, or with the advent of the first pains.

2. Secondary sections; those performed after a certain amount of labor had demonstrated this probably unsatisfactory character, but before exhaustion had set in and before it had become definitely established that the natural powers would fail to effect the passage of the brim.

3. Late sections; those performed after a definite arrest of the fetal head at the brim.

In these 289 cases, 82 were operated upon before labor began; 158 early in labor, and 49 after the failure of the maternal powers was established.

The 82 cases done before labor, yielded one death, a mortality of 1.2 per cent.; the 158 cases, done early in labor, showed six deaths, a mortality of 3.8 per cent.; the forty-nine cases, done after the arrest of the head or after an unduly long first stage, showed six deaths, a mortality of 12 per cent. His conclusions are:

First. It is clear that the mortality of primary sections is less than that of section performed during labor.

Second. It seems also clear that the section performed early in labor is safer than that undertaken after the failure of the natural powers.

Third. It is desirable that cases which are to be subject to the

Cesarean section should be selected as such, in advance of labor whenever the conditions make this possible."

For purpose of studying the morbidity of our cases, we present

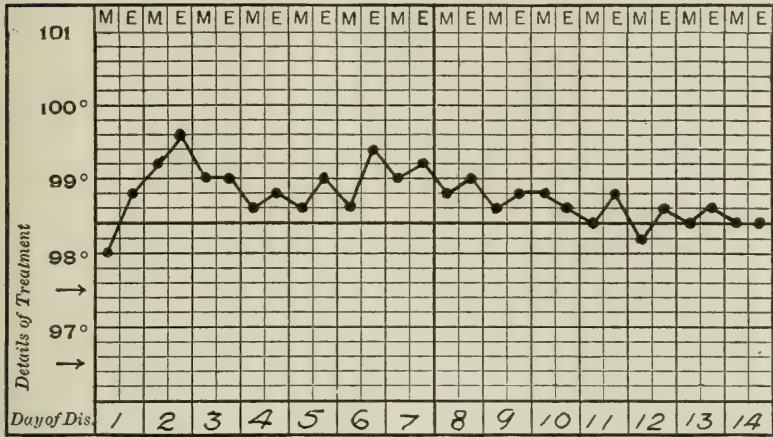


CHART I.—Elective cases.

the following charts. We have divided the cases into three groups: Primary, intermed'ate and secondary. The charts show the mean temperature for each group.

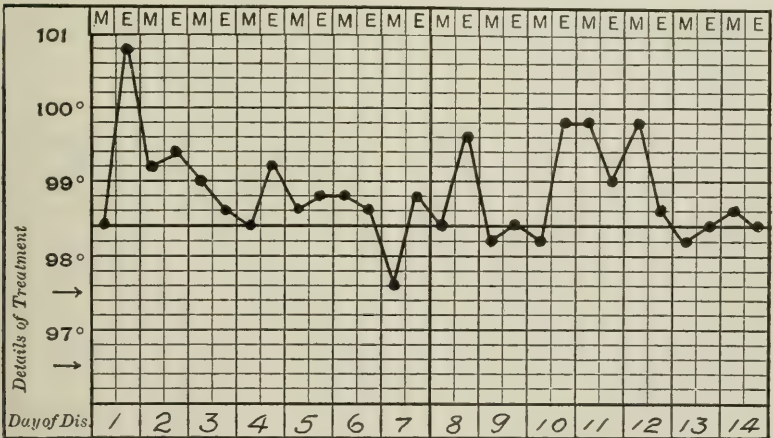


CHART II.—One to ten hours in labor.

Chart I is the average temperature in the primary cases operated upon before labor. It comprises cases II, IV, VII, XI, XII, XVII,

XVIII, XIX, XXI, XXII, XXIV, XXV, XXVI, XXVII, XXVIII, XXIX, XXXI, XXXIV, XXXVI, XXXVII, XLI, XLIV, XLV, and XLVI, a total of twenty-four. We have recorded the morning and evening temperature for two weeks following the operation. It will be seen that in this first chart the temperature at no time reached 100° F., and that throughout the greater part of the convalescence, the temperature was below 99° F.

Chart 2 shows the temperature of the intermediate cases operated upon after a test of labor of from one to ten hours. Cases

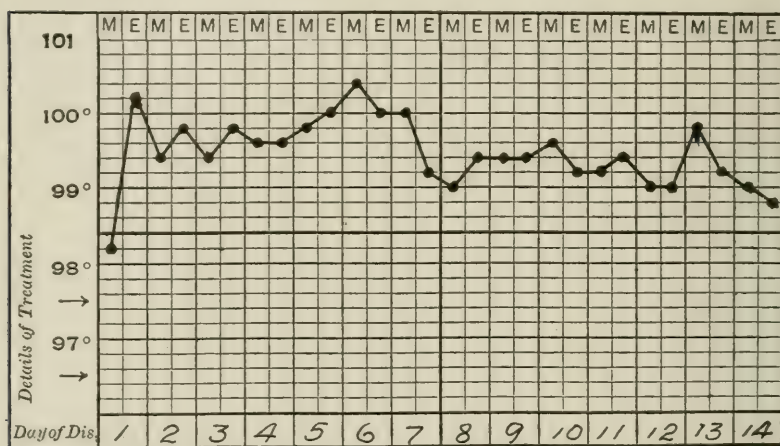


CHART III.—Ten to twenty hours in labors—one case forty-eight hours.

III, VIII, IX, XV, XXIII, XXXII, XXXVIII, and XLVII, a total of eight. Here we find some fluctuation, but at only one time did it reach over 100° F. This group includes some cases examined before entrance to the Hospital. In one case, a multipara, a tentative forceps operation was done.

Chart 3 shows the average temperature in the secondary cases, those operated upon having a labor test of from ten to twenty-four hours, and in one case, forty-eight hours. Cases I, V, VI, X, XIII, XIV, XVI, XX, XXX, XXXIII, XXXV, XXXVII, XL, XLII, XLIII, XLVIII, a total of sixteen.

CESAREAN SECTION, WITH DATES AND DETAILS OF CASES.

Case No.	Place of operation	Date of admission	Date of operation	Diagnosis	Indication	Result		Date of discharge	Remarks	Para
						Mother	Child			
1	Philadelphia Lying-In Charity	May 21, 1896	May 21, 1896	Vertex L.O.A.	Flat, rachitic pelvis with uterine myomata. In labor 48 hours.	Lived	Died	June 18, 1896	Labor obstructed. Emergency care. Septic. True conjugate, 6.5 cm.	I
2	Philadelphia Lying-In Charity	Aug. 10, 1897	Aug. 12, 1897	Vertex L.O.A.	Scolio-rachitic pelvis; second Cesarean section.	Lived	Lived	Sept. 10, 1897	Elective operation. True conjugate, 6.75 cm.	II
3	Medico-Chirurgical Hospital	Oct. 5, 1897	Oct. 16, 1897	Vertex L.O.A.	Coxalgic pelvis. First child craniotomy.	Lived	Lived	Nov. 16, 1897	In labor 10 hours.	III
4	Medico-Chirurgical Hospital	Oct. 3, 1898	Oct. 6, 1898	Vertex L.O.A.	Generally contracted pelvis. First and second child craniotomy, third forceps; fourth, fifth and sixth, premature labor. All dead.	Lived	Lived	Nov. 4, 1898	Elective Cesarean section.	VII
5	Medico-Chirurgical Hospital	Feb. 13, 1900	Feb. 13, 1900	Vertex L.O.A.	Scolio-rachitic pelvis; third Cesarean section. Same as case 2.	Lived	Lived	Mar. 10, 1900	In labor 13 hours; infant weight, 7 1/2 pounds.	III

CESAREAN SECTION, WITH DATES AND DETAILS OF CASES.—(Continued.)

Case No.	Place of operation	Date of admission	Date of operation	Diagnosis	Indication	Result		Date of discharge	Remarks	Para
						Mother	Child			
6	Philadelphia Lying-In Charity	Feb. 28, 1900	Feb. 29, 1900	Vertex R.O.P.	Obliquely contracted pelvis. First child, forceps. Dead. Second child, craniotomy.	Lived	Lived	Mar. 28, 1900	In labor 14 hours. Infant weight, 9 1/4 pounds.	III
7	Philadelphia Lying-In Charity	Aug. 28, 1900	Sept. 29, 1900	Vertex R.O.P.	Flat rachitic pelvis; first child forceps, dead. Second and third children, craniotomy.	Lived	Lived	Oct. 22, 1909	Elective Cesarean. Infant weight, 8 1/2 pounds. Resection of Fallopian tubes.	IV
8	Philadelphia Lying-In Charity	Feb. 9, 1901	Feb. 9, 1901	Vertex R.O.A.	Generally contracted pelvis. Three dead children.	Lived	Lived	Mar. 2, 1901	In labor 11 hours, tentative forceps operation. Cut down placenta.	IV
9	Philadelphia Lying-In Charity	Feb. 2, 1903	Feb. 2, 1903	Vertex R.O.P.	Generally contracted pelvis. Second Cesarean section. Same as case 8.	Lived	Lived	Mar. 1, 1903	In labor Fallopian tubes treated—uteroabdominal adhesions.	V
10	Philadelphia Lying-In Charity	April 15, 1903	May 25, 1903	Vertex L.O.A.	Rachitic pelvis.	Lived	Lived	June 29, 1903	In labor 15 hours.	I

CESAREAN SECTION, WITH DATES AND DETAILS OF CASES.—(Continued.)

Case No.	Place of operation	Date of admission	Date of operation	Diagnosis	Indication	Result		Date of discharge	Remarks	Para
						Mother	Child			
11	Philadelphia Lying-In Charity	July 5, 1903	July 28, 1903	Vertex R.O.P.	Rachitic pelvis first labor, craniotomy.	Lived	Lived	Aug. 25, 1903	Elective Cesarean. Fallopian tubes resected.	III
12	Medico-Chirurgical Hospital	Oct. 3, 1903	Nov. 15, 1903	Vertex L.O.A.	Flat rachitic pelvis; true conjugate, 6 cm.	Lived	Lived	Dec. 15, 1903	Elective Cesarean.....	I
13	Medico-Chirurgical Hospital	Sept. 23, 1905	Oct. 9, 1905	Vertex R.O.A.	Generally contracted pelvis. Exostosis at promontory of sacrum. True conjugate, 7.5 cm.	Lived	Lived	Nov. 6, 1905	In labor 12 hours. First labor difficult. Forceps. Dead child. Weight of infant, 7 ² / ₃ pounds.	II
14	At home of patient	.....	Feb. 15, 1906	Vertex R.O.P.	Labor obstructed by anterior fixation of the uterus.	Lived	Lived	Mar. 6, 1906	In labor 12 hours. A large mass (the anterior uterine wall) obstructed the pelvic inlet.	III
15	Medico-Chirurgical Hospital	Oct. 19, 1906	Nov. 12, 1906	Vertex L.O.A.	Generally contracted pelvis. Second Cesarean section. Same as case 13.	Lived	Lived	Dec. 14, 1906	In labor 8 hours. No adhesions.	III

CESAREAN SECTION, WITH DATES AND DETAILS OF CASES.—(Continued.)

Case No.	Place of operation	Date of admission	Date of operation	Diagnosis	Indication	Result		Date of discharge	Remarks	Para
						Mother	Child			
16	Philadelphia Lying-In Charity	Mar. 9, 1907	Mar. 9, 1907	Vertex R.O.A.	Funnel-shaped pelvis; two children born dead. Forceps.	Lived	Lived	Mar. 30, 1907	In labor 12 hours. Weight of child 8 1/2 pounds.	III
17	Philadelphia Lying-In Charity	July 22, 1907	July 23, 1907	Vertex R.O.P.	Generally contracted pelvis. Second Cesarean section.	Lived	Lived	Aug. 10, 1907	Elective Cesarean section. Very extreme omental and uteroabdominal adhesions.	II
18	Medico-Chirurgical Hospital	Apr. 10, 1908	Apr. 15, 1908	Vertex L.O.A.	Generally contracted pelvis. Four difficult labors.	Lived	Lived	Apr. 25, 1908	Elective Cesarean. Incision upon placental site.	V
19	Medico-Chirurgical Hospital	Jan. 1, 1909	Jan. 2, 1909	Vertex L.O.K.	Dwarfed pelvis; conjugata vera, 5 cm.	Lived	Lived	Jan. 23, 1909	Patient's height, 3 feet 10 inches. Elective Cesarean.	I
20	Philadelphia Lying-In Charity	Jan. 5, 1909	Jan. 5, 1909	Vertex R.O.P.	Generally contracted pelvis. First child, craniotomy.	Lived	Lived	Jan. 19, 1909	In labor 22 hours.	II

CESAREAN SECTION, WITH DATES AND DETAILS OF CASES.—(Continued.)

Case No.	Place of operation	Date of admission	Date of operation	Diagnosis	Indication	Result		Date of discharge	Remarks	Para
						Mother	Child			
21	Medico-Chirurgical Hospital	Sept. 10, 1909	Sept. 27, 1909	Vertex R.O.P.	Coxalgie pelvis same as case 2. Second Cesarean section.	Lived	Lived	Oct. 18, 1909	Second elective Cesarean section. Uteroaabdominal adhesions.	III
22	Philadelphia Lying-In Charity	Jan. 28, 1910	Feb. 9, 1910	Vertex R.O.A.	Rachitic pelvis. True conjugate, 6.5 cm.	Lived	Lived	Mar. 6, 1910	Elective Cesarean section.	I
23	Medico-Chirurgical Hospital	Apr. 4, 1910	Apr. 5, 1910	Vertex R.O.P.	Generally contracted pelvis. First child, craniotomy.	Lived	Lived	Apr. 22, 1910	In labor 6 hours.....	II
24	Philadelphia General Hospital	Jan. 13, 1910	May 6, 1910	Vertex L.O.A.	Rachitic dwarfed pelvis. True conjugate 7.5 cm.	Lived	Lived	June 6, 1910	Elective Cesarean section.	I
25	Medico-Chirurgical Hospital	May 9, 1910	May 11, 1910	Vertex L.O.A.	Funnel-shaped pelvis; first child, craniotomy.	Lived	Lived	June 1, 1910	Elective Cesarean section. Infant weight, 8 2/3 pounds.	II

CESAREAN SECTION, WITH DATES AND DETAILS OF CASES.—(Continued.)

Case No.	Place of operation	Date of admission	Date of operation	Diagnosis	Indication	Result		Date of discharge	Remarks	Para
						Mother	Child			
26	Medico-Chirurgical Hospital	May 5, 1910	May 19, 1910	Vertex-L.O.A.	Just minor pelvis; first labor prolonged, difficult—forceps. Child dead.	Lived	Lived	June 9, 1910	Elective Cesarean section.	II
27	Medico-Chirurgical Hospital	June 12, 1910	June 22, 1910	¹ Vertex-L.O.A. ² Vertex-L.O.A.	Toxemia of pregnancy; threatened eclampsia. Twins.	Lived	Lived	July 13, 1910	Elective Cesarean section.	I
28	Medico-Chirurgical Hospital	Feb. 1, 1911	Feb. 13, 1911	Vertex-L.O.A.	Rachitic, flat pelvis.....	Lived	Lived	Mar. 4, 1911	Elective operation for absolute indication. Conjugate external 16.5 cm. Conjugate vera, 7.5 cm.	I
29	Medico-Chirurgical Hospital	Mar. 10, 1911	Mar. 13, 1911	Vertex-L.O.A.	Flat pelvis, exostosis at promontory of sacrum. Second child Cesarean section.	Lived	Lived	Mar. 27, 1911	Repeated section elective.	III
30	Medico-Chirurgical Hospital	Apr. 6, 1911	Apr. 7, 1911	Transverse	Labor obstructed by ventrofixation of uterus, and child dead before operation.	Lived	Dead	Apr. 29, 1911	Child dead on admission to hospital. 20 hours in labor.	V

CESAREAN SECTION, WITH DATES AND DETAILS OF CASES.—(Continued.)

Case No.	Place of operation	Date of admission	Date of operation	Diagnosis	Indication	Result		Date of discharge	Remarks	Para
						Mother	Child			
31	Medico-Chirurgical Hospital	June 20, 1911	July 7, 1911	Vertex L.O.A.	Coxalgie pelvis, contracted outlet.	Lived	Lived	July 24, 1911	Elective section.....	I
32	Medico-Chirurgical Hospital	July 20, 1911	July 20, 1911	Vertex L.O.A.	Generally contracted pelvis. One Cesarean 2 years ago.	Lived	Lived	Aug. 5, 1911	In labor 10 hours. Repeated Cesarean.	II
33	Medico-Chirurgical Hospital	Nov. 5, 1911	Nov. 5, 1911	Vertex R.O.P.	Generally contracted pelvis. Head high.	Lived	Lived	Dec. 5, 1911	24 hours labor, primipara. Dwarf.	I
34	Philadelphia General Hospital	Apr. 7, 1912	Apr. 26, 1912	Vertex R.O.P.	Generally contracted rachitic pelvis. External conjugate 17 cm. True conjugate 7 cm.	Lived	Lived	May 28, 1911	Elective.....	I
35	Medico-Chirurgical Hospital	Apr. 29, 1912	Apr. 29, 1912	Vertex L.O.A.	Funnel pelvis. Primipara....	Lived	Lived	May 19, 1912	Labor 24 hours.....	I

CESAREAN SECTION, WITH DATES AND DETAILS OF CASES.—(Continued.)

Case No.	Place of operation	Date of admission	Date of operation	Diagnosis	Indication	Result		Date of discharge	Remarks	Para
						Mother	Child			
36	Medico-Chirurgical Hospital	Nov. 11, 1912	Nov. 25, 1912	Vertex R.O.A.	Contracted pelvis. External conjugate 17 cm.	Lived	Lived	Dec. 16, 1911	Elective.....	I
37	Medico-Chirurgical Hospital	Feb. 11, 1913	Feb. 12, 1913	Vertex L.O.A.	Funnel pelvis. External conjugate, 18 cm.	Lived	Lived	Feb. 26, 1912	Both previous labors child dead. (Elective.)	III
38	Philadelphia Lying-In Charity	Feb. 14, 1913	Feb. 16, 1913	Vertex L.O.A.	Generally contracted pelvis and prolapse of funis.	Lived	Lived	Mar. 4, 1913	10 hours in labor. Membranes ruptured.	I
39	Medico-Chirurgical Hospital	Mar. 15, 1913	Mar. 16, 1913	Vertex L.O.A.	Funnel pelvis. In labor 15 hours.	Lived	Lived	Apr. 3, 1913	Labor 15 hours. Head high. Extensive caput.	I
40	Philadelphia General Hospital	Mar. 6, 1913	May 12, 1913	Vertex R.O.A.	External conjugate 17 cm. True conjugate 7 cm. Contracted pelvis. Exostosis at promontory of sacrum.	Lived	Lived	June 4, 1913	14 hours in labor. Membranes ruptured.	VI

CESAREAN SECTION, WITH DATES AND DETAILS OF CASES.—(Continued.)

Case No.	Place of operation	Date of admission	Date of operation	Diagnosis	Indication	Result		Date of discharge	Remarks	Para
						Mother	Child			
41	Philadelphia Lying-In Charity	Apr. 29, 1913	June 27, 1913	Vertex L.O.A.	Rachitic pelvis. Repeated section.	Lived	Lived	July 15, 1913	Elective.....	II
42	Medico-Chirurgical Hospital	Nov. 23, 1913	Nov. 23, 1913	Vertex R.O.P.	Rachitic pelvis. True conjugate 7 cm. (1 craniotomy). Obliquely contracted.	Lived	Lived	Dec. 8, 1913	In labor 24 hours. Emergency case. Repeated Cesarean.	V
43	Medico-Chirurgical Hospital	Nov. 26, 1913	Nov. 26, 1913	Vertex L.O.A.	Funnel pelvis. Exostosis at promontory.	Lived	Lived	Dec. 10, 1913	In labor 16 hours. Pituitary extract used without effect.	I
44	Medico-Chirurgical Hospital	Jan. 12, 1914	Jan. 12, 1914	Vertex L.O.A.	Eclampsia at 8th month of gestation.	Lived	Lived	Feb. 2, 1914	3 convulsions. No labor. Right cervix. (Elective.)	I
45	Philadelphia Lying-In Charity	Sept. 10, 1913	Jan. 17, 1914	Vertex R.O.A.	Transversely contracted pelvis; albuminuria.	Lived	Lived	Feb. 9, 1914	Toxemia. (Elective).....	I

CESAREAN SECTION, WITH DATES AND DETAILS OF CASES.—(Concluded.)

Case No.	Place of operation	Date of admission	Date of operation	Diagnosis	Indication	Result		Date of discharge	Remarks	Para
						Mother	Child			
46	Medico-Chirurgical Hospital	Jan. 19, 1914	Jan. 20, 1914	Vertex L.O.A.	Eclampsia at 36th week of gestation.	Lived	Lived	Feb. 6, 1914	7 convulsions. No labor. Rigid cervix. (Elective.)	I
47	Medico-Chirurgical Hospital	Jan. 27, 1914	Feb. 19, 1914	Vertex L.O.A.	Carcinoma of cervix.....	Lived	Lived	Mar. 9, 1914	Labor 10 hours.....	III
48	Philadelphia Lying-In Charity	Mar. 7, 1914	Mar. 7, 1914	Vertex L.O.A.	Rachitic pelvis.....	Lived	Lived	Mar. 26, 1914	12 hours in labor.....	I

This group includes one case probably septic. It shows, as would be expected, slight elevation of the temperature throughout the two weeks, but not as high a record as we had anticipated. These charts bear out Reynold's conclusions, for it will be seen in Chart 1, which is a record of 50 per cent. of the cases operated upon before the onset of labor, that the temperature course was almost afebrile. Although the number of cases studied is small, and the results cannot be considered conclusive, it seems to us that the charts also show that the patient can be carried well into labor without necessarily endangering her chance for recovery by Cesarean section. If this conclusion is correct it will aid us in a solution of the problems we often face in moderately contracted pelvis and fatal dystocia, for here, in many cases, it is difficult for the expert to decide upon the correct course to pursue prior to the onset of labor.

We would recommend the so-called labor test, only when the patient is under the direct supervision of the obstetrician; and, preferably, in a hospital where the surroundings are aseptic, and where surgical intervention can be instituted at the shortest notice. The length of labor which the patient can undergo with safety, will depend upon the case under study, whether she is old or young, sthenic or anemic, primiparous or multiparous; and can only be determined upon by the attendant, for some women bear labor with little constitutional disturbance, and reach the second stage still in good condition, while others begin to show the symptoms of exhaustion early in labor.

We believe that many cases can be carried safely until the completion of the first stage and the rupture of the membranes; and, in the exceptional case, until the specialist can ascertain what moulding and compression of the head will do to overcome the apparent obstruction. If it were possible to predetermine the method of delivery in all cases, then this expectant course of treatment would not be necessary. We do not feel that this is possible in the borderline cases. We must study each patient individually, and, to maintain a low mortality, great care and judgment must be exercised.

After the membranes rupture, the patient is exposed to infection from bacterial invasion. The dangers of operating now increase; and, if added to this, we have numerous examinations and possibly some attempt at manual or surgical interference, the case becomes a great surgical risk.

Routh of London collected, as we have already mentioned, 1282 cases of Cesarean section performed by over 100 obstetricians and gynecologists in the United Kingdom. He found that where at-

tempts had been made to deliver by forceps, or where repeated examinations had been made, the mortality was 34.3 per cent. When the patient was in labor and the membranes ruptured, but no attempt had been made to deliver, the mortality was 10.8 per cent. When the patient was in labor with the membranes unruptured, the mortality was 2.2 per cent.; and, finally, when the patient was not in labor, the mortality was 2.6 per cent.

This low mortality Routh contrasts with cases where the membranes were ruptured, or where frequent examinations or attempts at delivery, had been made. In these cases the mortality was 17.3 per cent. Where the membranes are ruptured he believes that the amniotic fluid should be studied microscopically, and that by so doing, immediately a definite method of treatment can be adopted.

Peterson has been much interested in the study of infection after the membranes rupture; that is, in cases where the rupture occurred before the advent of labor, or early in the first stage of labor. He believes that the early rupture of the membranes is a distinct menace because of the danger of infection. His assistant, Dr. George Kamperman, has investigated the records of a series of cases in the maternity wards with reference to the frequency of sepsis in premature rupture of the membranes. In a series of 300 cases he found that a mild infection occurred eight times as frequently after premature as after normal rupture, while severe sepsis occurred twenty times as often.

It seems from this clinical study that premature rupture of the membranes predisposes toward sepsis. It is very interesting from the clinical standpoint, but when we consider how frequently pathogenic organisms are found in the lower birth canal in the apparently healthy patient, the surgeon will be influenced in many cases chiefly by the patient's clinical condition. In twenty-four of the forty-eight cases here reported, the patients had been in labor from one to forty-eight hours, and in many of these cases the membranes were ruptured and some, probably, slightly infected, but all recovered.

Humpstone in 1911 reported twenty-five Cesarean sections without maternal or fetal death. Only six of his cases were operated upon before labor, the remaining cases having been in labor at the time of section, anywhere from two to fifty hours. Lovier, in 1911, contributed a study of nineteen operations performed from forty-five minutes to sixteen hours after the rupture of the membranes. All of the mothers and children survived, although 31 per cent. of the mothers showed some morbidity. In one case the silk sutures caused a fistula to form. He recommends closure of the uterus with a layer

of buried suture and a superficial row of Lembert sutures. Before opening the uterus he thinks it advisable to evert the organ, but this entails a large abdominal incision. On the whole, he prefers the classical section, even in presumably septic cases, to facing the difficulties of the extraperitoneal operation.

The successful results here reported in the secondary cases may be unusual, but it shows that although the patient has had a long labor, Cesarean section may be resorted to. When the surgeon sees the case late, and there is a history of internal examinations, and some attempt to deliver has been made, it is difficult to decide upon the proper course. In the majority of these cases, if the child is dead or dying, craniotomy should be performed. There are, however, a few exceptions to this course; where there exists excessive pelvic deformity, or an insuperable obstacle in the pelvis, section may be necessary. In two of our cases this course was demanded. In both the labor was obstructed by a tumor occluding the pelvic canal. Craniotomy, if performed, will end the pregnancy and save the reproductive organs.

In the neglected or suspect cases, where infection exists, the classical Cesarean section will be contraindicated, and in its stead supravaginal hysterectomy or extraperitoneal operation will be done. Hysterectomy is mutilating, ending the fertility of the patient, but the results are more satisfactory in septic cases. If classical Cesarean section is performed and the septic uterus left behind, there exists the general danger of infection of the wound, and later, the peritoneal cavity.

To overcome infection and still save the uterus, the extraperitoneal operation has been recommended. This operation was first performed by Jorg and then by Ritgen and Baudelocque. In 1870, Gaillard Thomas of New York, and later Skene, resorted to an extraperitoneal method described as gastroelytrotomy. The operation was performed as follows: First a manual dilatation of the cervix was made, then an incision from the symphysis, parallel with Poupart's ligament, to the anterior superior spine of the ileum. A dissection was then made down to the peritoneum which was separated and pushed upward. The cervix and vagina were then exposed, and the latter incised upon a sound introduced into the vagina as a guide, then the cervix was drawn through the wound in the vaginal wall into the external wound in the abdominal wall, and the child delivered. Thomas operated twice with one death. Frank, of Cologne, in 1907, was the first to resort to the extraperitoneal operation by making a suprasymphyseal section of the

lower uterine segment and beneath the anterior reduplication of the peritoneum. Because of the high mortality following the classical operation at that date, this newer procedure was rapidly taken up by other German operators, namely, Sellheim, Doederlein, Latzko and Veit. Nicholson has made an exhaustive study of this subject. He states, "The anatomical facts upon which all these operations are dependent are first, and most important, the distention of the lower uterine segment. Secondly, the migration of the peritoneum during pregnancy, whereby the bladder is more or less deprived of peritoneum, and becomes in late labor uncovered by the peritoneum above and in front. Thirdly, the growth of the peritoneum due to the hypertrophy of pregnancy; and, finally, the loosening of the peritoneal reflection over the lower uterine segment, which is so well shown in vaginal Cesarean operations, enables it to be separated from the uterine wall with the greatest ease."

The first method described by Frank was a transperitoneal operation, but in his second method he attempts to fulfill the aim of a truly extraperitoneal procedure. His method was as follows: the abdominal wall was opened by a Pfannenstiel incision, then a small opening was made in the parietal peritoneum for the purpose of locating the bladder. This organ was then freed from its peritoneal coat by blunt dissection. The incision into the parietal peritoneum was then closed. The peritoneum was then freed from the anterior base of the uterus, and, finally, incised transversely. Numerous modifications of the operation have been made, but whether the lower uterine segment is opened through an incision parallel to Poupart's ligament, or transperitoneally, with the stitching of the parietal peritoneum to the visceral peritoneum, the object is to incise the lower uterine segment extraperitoneally to avoid infection. This operation is more difficult than the classical Cesarean section, and it is impossible in all cases to perform it without opening the peritoneum. When the transperitoneal operation is performed and the uterus finally shut off from the peritoneum, in the extraction of the child, there is danger of stretching the uterine wound and tearing out the stitches.

Because of these difficulties (although it is popular in Germany), it has few advocates in the United States. One of its German supporters, Baisch, in 1911, reports fifty cases. In every case an attempt was made to enter into the peritoneal cavity, but in three of the cases this was impossible. In sixteen cases, the peritoneum was torn in extracting the child. It was immediately stitched up. The maternal mortality in his cases was three out of fifty. He thinks

that the operation is suitable in many operations in which the classical operation is contraindicated because of the infection. He recommends a mesial longitudinal incision. Next the recti are separated and the bladder pushed to the right or left side. As a rule, the peritoneal fold then appears distinctly as a whitish band. This is pushed up as far as possible, and the uterus is opened in the middle line. He limits the operation to suspect cases.

Küstner has favored the extraperitoneal operation since the first publications of Frank and Sellheim on the subject. He has performed seventy-two operations, and advises its use in infected cases. In only four of these cases was the child dead, and the mother's interests were in no case affected, even although the liquor amnii was often fetid and the patient feverish, cases where the classical or transperitoneal operation could not be thought of. Hirst, probably the most enthusiastic advocate of this operation in America, has performed nine operations without maternal or fetal mortality. He not only resorts to it in suspect cases, but advocates it also in clean cases to prevent intraperitoneal adhesions subsequent to operation, and hernia. He also claims that the convalescence is more satisfactory than when the classical operation is performed. To-day the modern extraperitoneal operation is not recommended in cases of marked infection. The transperitoneal technic is preferred by many because it is easier to perform, there is less danger to the bladder, and it avoids infection of the retroperitoneal tissues.

For the purpose of reducing the danger from infection and the formation of postoperative adhesions, Cesarean section has been further modified by various operators. The uterine incision is made in various positions on the anterior wall, from the lower segment to the fundus. It is made longitudinally or transversely at the fundus (Fritsch).

Davis, A. B., advises a high abdominal incision and claims for this method less trauma and less likelihood of the formation of adhesions. Polano describes a method by which the child is delivered through a sagittal incision made in the posterior aspect of the uterus at the level of the cervix and lower uterine segment. He claims for this operation the advantages of the low incision, which are also present with the extraperitoneal methods, but it is superior to those various methods in the fact that it is easier to do, with less hemorrhage and less difficulty in delivering the child.

The technic is as follows: The uterus is everted in the usual manner, and forcibly anteflexed over the anterior abdominal wall. The cervix and lower segment are incised as described above, the

membranes are ruptured and the child delivered. If the case is suspected or difficulty found, a drainage tube is inserted in the upper part of the wound and drawn through the cervix into the vagina. This tube may be of glass or rubber. He has carried out four deliveries by this method, all of whom did well. Some operators eventrate the uterus before delivering the child, while others operate upon the uterus *in situ*.

Both seem to be able to report equally satisfactory results. Hemorrhage from the uterine incision was considered at one time of moment, and to prevent this a compression of the lower segment of the uterus was made by encircling it with a constricting rubber band or else broad ligaments were grasped by an assistant. Hemorrhage to-day gives the operator little concern and is usually controlled by compressing the uterus manually. Various methods of suturing the uterine wound have been suggested, and several suture materials recommended. One method seems to be as good as another, and as to suture material, silk is used as frequently as catgut. Bar, Leopold, Davis, E. P., and others use silk and claim an advantage in the ease with which it is sterilized and the safety of the knot. The objection to silk is that it is not absorbent and may, by its presence in a tissue, give rise to adhesions. Chromic gut is open to the same criticism, as illustrated in a case reported recently by Studiford, who had occasion to operate upon a patient eleven months after a second Cesarean section and found the chromic gut used to close the uterine wound, still present. Whatever method of suturing is used, the greatest care should be exercised to avoid excessive handling and crushing of the tissues; and next, a careful approximation of the parts. In regard to the suture material, it should be as fine as is consistent with safety, and whether we use catgut or silk, it is immaterial; the important thing to see to is its sterilization.

The technic we have employed in the classical Cesarean section is as follows: In addition to the usual preparation of abdomen and vaginal canal, prior to the operation, a final disinfection of the vagina is made by an assistant just before the abdomen is opened. It consists in the scrubbing of the external genitalia with green soap and vaginal douche of sterile water. Following this, the patient is catheterized. The abdominal incision is made first below the umbilicus sufficiently large to enable the operator to introduce the hand to explore the position of the uterus. The incision is then completed with the umbilicus as a midpoint. The uterus is not eventrated, but is brought into close apposition with the abdominal wall by pressure. A longitudinal incision is now made in the uterus

with a knife, only large enough to permit the extraction of the child. The infant is grasped by the feet and delivered. With the contraction of the uterus which now occurs, an assistant lifts it from the abdominal cavity. Should the bleeding be free, the uterus is compressed manually. If this fails, the cavity of the uterus is filled with hot water. Ergot or pituitary extract has not been used. We feel that it is unwise to hurry the removal of the placenta, and wait for a time when the uterus is firmly contracted. In the elective cases, the cervix is slightly dilated by slipping the glove finger down through the internal os to the vagina. The uterine incision is now closed by the use of an interrupted through-and-through silk suture of medium size, as fine as is consistent with safety. These sutures are placed at intervals of about 1 cm. A curved needle is used for this purpose. The suture is inserted in the peritoneum about one-fourth of an inch in the incision. It is carried through the body of the muscle and down to the decidua. These steps are reversed on the opposite side. A second row of superficial sutures of a finer quality of silk is inserted to bring securely together the peritoneum. The method of closing the abdominal wall we vary with the case. If the patient is corpulent, a through-and-through suture of silkworm-gut is used, but in the favorable case, a continuous suture of catgut is used to close the peritoneum, and an interrupted suture of the same material for the aponeurosis of the recti, and finally, for the skin, a subcuticular running stitch of silkworm-gut. The postoperative treatment does not differ from the ordinary celiotomy.

CONCLUSION.

The mortality in Cesarean section depends upon the skill of the operator and the condition of the patient at the time of operation.

In clean cases, operated upon before labor, the maternal mortality should not be more than from 2 to 3 per cent.

When the case is under careful supervision, the labor test does not necessarily contraindicate the classical operation, but after the membranes rupture, there exists danger of infection.

The classical operation should not be performed in cases undoubtedly infected.

The chief indication for the extraperitoneal or transperitoneal section is the "neglected case," or when that is mildly infected.

When, however, the patient is seen late in labor, and undoubtedly infected, then, because of the high mortality, probably 25 per cent., supravaginal hysterectomy must be performed.

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REVIEWS.

DIE GONORRHOË DES WEIBES. FÜR DIE PRAXIS DARGESTELLT.
 VON PROF. DR. F. FROMME, Oberarzt der Frauenklinik der Königl.
 Charité in Berlin. Berlin, 1914, S. Karger.

The monograph which is herewith presented by one of the leading German gynecologists is intended for the practising physician and comprises the teachings of the author in his lectures to post-graduate students at his personal courses of instruction. The voluminous literature on the subject and its critique has therefore not been noted, although the author quotes frequently from both Bumm and Menge. After discussing the frequency and extent of gonorrhœa in the female, the manner of infection, the pathology, morphology and histology is discussed, followed by an account of the symptoms and the clinical course of the disease. The diagnosis of gonorrhœa in the female is next discussed, but the author gives no space whatever to the more recent serological methods which have now become quite generally employed. In making a diagnosis, the history, together with the clinical findings and bacteriological examination is accepted by him as sufficient evidence. The prophylaxis and treatment of the disease is very satisfactorily discussed and the author follows the generally employed methods,

adhering to the dictum now generally accepted that during the acute stage a very conservative attitude should be observed. After the acute stage has subsided, which he states is marked by an absence of fever especially during menstruation, other steps may be taken to treat the disease or its complications. Fromme advises vaccination in cases of pyosalpinx only in those cases where the gonorrhoeal process is at a standstill. He advises the use of gradually increasing doses given intramuscularly and claims to have had good results. When operations for adnexal complications become necessary he believes that the uterus and one ovary should be preserved, although both tubes must be completely excised. If the process involves the uterus, however, he does not believe it advisable to retain the same, although still advising the retention of one ovary where a hysterectomy is done.

ANESTHETICS, THEIR USES AND ADMINISTRATION. BY DUDLEY WILMOT BUXTON, M. D., B. S. Fifth Edition. Philadelphia: P. Blakiston's Son & Company, 1914. Price \$3.00 net.

The advances in the domain of anesthesia during recent years has necessitated a revision and enlargement of this well-known manual. Among the more recent developments in this field may be included the administration of nitrous oxide and oxygen in major surgery, ether by the open method, by infusion, by intratracheal and pharyngeal insufflation and by colonic absorption; the methods of local, regional and spinal analgesia and the employment of alkaloids in analgesia and anesthesia. Buxton wisely calls attention to the routine haphazard system of giving anesthetics and calls attention to the necessity of carefully studying the individual case before deciding on the particular method to be employed. He does not think it reasonable in view of the advances of the present day that the authors of current works on surgical procedures should be misleading in so far as they suggest simple methods and decry scientific ones, ignoring the fact that the former are often instinct with danger except in the hands of experts and that the latter are only difficult to those who have not mastered the essential technic.

In reading the book one is impressed by the enormous amount of original research work and observations which has been expended in this field and which demonstrates conclusively the importance of anesthesia in successful surgery. A chapter is devoted to the subject of anesthetics in obstetric practice in which an unfortunate reference is made to the preference of chloroform in eclampsia in one place, but a more satisfactory suggestion in another that the prolonged inhalation of chloroform produces a deleterious effect on the patient.

Gauss' twilight sleep method of anesthesia in childbirth by the use of scopolamine and morphine is described, but not subjected to sufficient criticism as notwithstanding the claims of the original author, the method is not free from danger. A very satisfactory chapter is that devoted to the accidents of anesthesia and the subject of both local and spinal analgesia is quite extensively discussed.

An important chapter which concludes the work is that on the medicolegal aspects of the administration of anesthetics.

THEORIE UND PRAXIS DER BLUTENTZIEHUNG. NACH DEM GEGENWÄRTIGEN STANDE DER WISSENSCHAFT BEARBEITET. VON PROF. DR. HEINRICH STERN, New York. Würzburg, Curt Kabitzsch, 1914.

The importance of venesection in medicine has been greatly revived in recent years and a great number of references are scattered throughout the literature in the form of monographs and journal articles which deal with the experimental and therapeutic phases in isolated classes of cases. The great success of the method in many instances has gradually led to overcoming the prejudices in regard to the method which universally existed up to within a comparatively short period. Dr. Stern's book is an attempt to collect the information thus obtained in a manual which unfortunately, although the author is an American practitioner, has been published in German. An English translation of the same would undoubtedly meet with a favorable reception. The author has maintained a more or less conservative attitude in advising this measure, and has restricted himself to describe only those conditions of disease in which venesection has been shown to be accompanied by well-marked and clinically proven results. For this reason he has omitted any reference to its application in gout, rheumatism, neuralgia and other diseases in which the procedure is not indicated nor from which definite results have been obtained. He is justified in stating very plainly that although of great value in certain conditions, venesection is not a panacea.

He divides his book into two portions, the first of which deals with the general indications for venesection and describes the method, and the other considers the special application in various diseases. In conclusion he discusses the prophylactic value of the procedure in a variety of conditions and concludes with a satisfactory bibliography and index.

PROSTITUTION IN EUROPE. By ABRAHAM FLEXNER. Introduction by John D. Rockefeller, Jr. New York: The Century Co., 1914.

Although written by a layman, this book will be of considerable interest to the medical man, as the subjects treated involve to a large extent a great many aspects of medical practice. Mr. Flexner has devoted a year's study to this question in all the large cities of Europe and was assisted in securing first-hand information by police authorities and private agencies. In contrast to so many so-called "reformers," Mr. Flexner discusses the various aspects of this important problem without the bias which we so often meet with. He shows, moreover, that the general belief in this country regarding certain aspects of the sexual vice problems abroad are either non-existent or contrary to such belief. For example, the question of sex education is not apparently regarded as of such great importance as with us. Moreover he declares that the so-called white slave

traffic is practically nonexistent in Europe. Police regulation, which has been proposed as the solution of the prostitution evil, is apparently dying out and segregation likewise does not exist to the extent which is generally assumed. Moreover Mr. Flexner declares that the medical examination of prostitutes is in general a farce, and that it probably spreads more disease than it detects. After considering the question of demand and supply of prostitutes he discusses the subject in relation to the law and disease. In Europe, as with us, police corruption seems to interfere very largely with the system. The author believes that the final objection to regulation is not that it fails as a hygienic measure or is unnecessary as a police measure, but that it obstructs and confounds the proper attitude of society toward all social evils of which prostitution is merely one. He thinks that in its ultimate effect it is a compact with vice, and although it may not intend to encourage the social evil, by conceding to vice a privileged position, it discourages all effort to prevent or uproot it.

To medical men the chapters on "Abolition" and "Disease" will of course attract the most interest. Apparently regulation interferes very largely with the control of venereal diseases, because the police can only deal with a comparatively small number of cases. No evidence has been discovered either statistical or other to lead to the belief that regulation at all reduces the ravages of venereal diseases, but that there is good reason to believe that the licensed bordel and the medical examination contribute to the aggravation of this condition by increasing miscellaneous commerce and by decreasing resistance. Flexner claims that there is no ground for believing that abolition decreases disease, but that there is excellent reason for believing that abolition, plus a deliberately planned and organized dispensary system, has already proved a mitigating factor and is capable of much greater usefulness than has yet been anywhere realized.

Mr. Flexner's well-known investigation of medical colleges, both here and abroad, a few years ago has shown him to be an investigator with a thoroughly trained mind and power of observation, whose writings no matter on what subject, must be received with consideration. In the present work he has further qualified himself as an expert and is deserving of commendation for the valuable results presented in his most recent work which is deserving of the attention of the medical profession for numerous reasons.

TRANSACTIONS OF THE NEW YORK ACADEMY OF MEDICINE.

SECTION ON OBSTETRICS AND GYNECOLOGY.

Stated Meeting, Held May 26, 1914.

DR. GEO. W. KOSMAK *in the Chair.*

REPORT OF A CASE OF GANGRENE OF THE LUNG FOLLOWING OPERATION FOR ECTOPIC GESTATION; RESECTION OF RIB, RECOVERY.

DR. LILLIAN K. FARRAR.—The patient presented is an Austrian, housewife, thirty years of age. She has been married nine years, has no children, but has had one spontaneous miscarriage. She gives a history of a vaginal discharge beginning immediately after her marriage.

Her present illness began in December, 1906, when her menstrual period was one week overdue. She flowed profusely and had sharp cutting pains. The flow continued with intermissions until March 21, 1907, when she was referred to me with the diagnosis of ectopic gestation.

Physical examination showed a strong robust woman, markedly anemic. Pelvic examination revealed a cervix hard in consistency, a uterus slightly enlarged and to the right, the left tube palpable and moderately prolapsed. To the right of the uterus was a large mass, indefinite in consistency, markedly pulsating, and moderately tender on palpation.

On March 22, I curetted the uterus, removing a moderate amount of decidua, and then opened the abdomen. The right tube was enlarged at the distal end to the size of a goose's egg, dull red in color, and firm in consistency. Around the tube and adherent to the intestines was a large number of old blood clots. I resected the right tube and ovary and the left tube which was diseased, and removed the appendix. The patient was returned to the ward in good condition.

That evening on returning to the ward I found a window open directly back of the patient's bed and a strong wind blowing on her. The following morning the patient was unable to speak above a whisper, and that afternoon the temperature rose and pulse and respiration were accelerated. The temperature remained up for the following week with only slight morning remissions. The patient continued to speak in a whisper and expectorated considerable

tenacious white material; otherwise her condition was negative. She gave a history of an old pharyngitis. The week of April 1, the sputum became copious, tenacious, with a marked foul, sickening odor. Her pulse was 110 to 120 and respiration 30. The abdominal condition was absolutely normal, the wound having closed by first intention. The blood showed marked leukocytosis. The urine was normal. On April 2 (ten days after the operation) the respiratory note was prolonged, there was dulness and bronchial breathing noted over an area about the size of a silver dollar in the right lung, posterior and to the right of the angle of the scapula, and in the fifth interspace.

On April 12, the sputum contained a moderate number of pneumococcus bacilli and elastic tissue.

On April 14, the temperature became septic in type, pulse 120, and respiration from 30 to 36. On April 18, I aspirated at the fifth rib but no fluid was obtained. I then aspirated at the level of the sixth rib 1 inch to the right of the angle of the scapula, and finding fluid, greenish in color, I resected two ribs. A large amount of foul greenish fluid escaped. The culture of this fluid in agar-agar and calcium broth showed a pure culture of the pneumococcus bacillus.

The lung was retracted and converted into a gray-green fetid pulp. At its lower border was a cavity about an inch in diameter coated with a greenish-white slough. The odor was intensely sickening. The patient made a slow recovery from this time on.

The points of interest in this case are: 1. The marked anemia of the patient, following the prolonged flow of blood. 2. The exposure to cold when the vitality was already lowered by the operation. 3. The presence of old blood clots adherent to the intestines. 4. The primary union of the wound. 5. A septic embolus carried into the pulmonary artery. 6. The area of central pneumonia without physical signs until the tenth day. 7. The presence of the pneumococcus was not demonstrated until the twentieth day. 8. The septic temperature on the twenty-second day. The purulent effusion on the twenty-seventh day.

RUPTURE OF CORPUS LUTEUM, ACCOMPANIED BY FREE INTRAPERITONEAL HEMORRHAGE.

DR. MILTON R. BOOKMAN read this paper.*

LIVER FROM A CASE OF ECLAMPSIA, SHOWING EXTENSIVE SUBCAPSULAR HEMORRHAGES.

DR. GEORGE W. KOSMAK.—This patient, an Italian nineteen years of age, was admitted to the Lying-In Hospital on May 3, 1914, at 11.30 P. M., in a condition of coma, seventeen hours after delivery. She had been well throughout her pregnancy until the

*For original article see page 416.

night of May 2, when she was suddenly seized with convulsions and was delivered the next morning by forceps at her home. She had a total of twenty-one convulsions after this, until 2 P. M., May 3, when she went into a condition of coma. She did not again become conscious and died at 4.30 o'clock on the morning of May 4, having had one more convulsion at 3.45 A. M. The baby weighed 4 kilos and lived. At autopsy the following facts were noted. The liver was enlarged, weighed 2470 grams, and presented numerous subcapsular hemorrhages scattered over its entire surface. Sections show many hemorrhagic areas throughout the substance of the organ. Microscopical examination showed necrosis, autolysis, and disintegration of the hepatic cells of the central two-thirds of the liver lobule. There were also many hemorrhagic areas throughout the liver substance which had destroyed the hepatic cells from pressure. Many of the cells showed cloudy swelling but there was only a very small amount of fatty degeneration present. The kidneys showed an acute diffuse nephritis. A few petechial hemorrhages were noted in the spleen. The lungs were edematous and many of the air vesicles were filled with blood.

A CASE OF SUPPURATIVE APPENDICITIS OCCURRING DURING PREGNANCY.

DR. MARY D. RUSHMORE (report read by Dr. Wilhelmina A. Ragland.) This patient, a woman twenty-eight years of age, and three and one-half months advanced in her pregnancy, was admitted to the hospital, complaining of severe cramp-like pain in the right lower abdominal quadrant, from which she had been suffering for the past week. Her temperature was 100° F., pulse 96, and respiration 24. She seemed in good condition and did not appear to be distressed except at intervals of about one-half hour, when she had attacks of pain lasting about a minute.

Her past history was negative, except for an attack of typhoid fever at the age of eight years. At the age of eighteen she had an attack of *ardor urinæ* which lasted a few days, and again one year ago she was treated for the same symptom, which had reappeared at the onset of the present illness one week previous. The bowels had always been regular, the menstrual history negative, the last menstruation having occurred three and one-half months ago. The present illness began one week ago when the patient awoke at night with severe cramp-like pains in the right lower abdomen; she was unable to sleep again, and the following morning took saline cathartics, which she said caused her to vomit once, after which she felt feverish. The pain continued through the night and the following morning. She called her family physician who treated her for appendicitis, until he referred her to the hospital. The physical examination was negative except for an indefinite cystic mass in the right lower abdominal quadrant, extending from the symphysis pubis to about 5 cm. below the umbilicus. It seemed to be confined to the right side of the median line, but the abdominal walls were tense and rigid, and the examination caused considerable pain,

so that no distinct area of dullness, or flatness, or tangible outline of a tumor could be elicited. Vaginal examination revealed nothing save the pregnant uterus and a small lymphatic gland in the left vaginal fornix, but the tumor-like area of the right side seemed to be adherent to the uterus, and ovarian cyst and hydronephroma were also considered in the diagnosis. The white blood corpuscles numbered 14,000. Soon after admission the pain subsided and did not recur until the following day when it lasted three hours and again disappeared. The third day the patient had comparatively no pain, and the temperature and general condition remained the same. The fourth day the abdomen was found to be 5 cm. larger round the iliac spines than when she entered the hospital. The fifth day an anesthetic was given and the mass was more satisfactorily palpated. Operation was decided upon and the same narcosis continued to serve at the operation. An incision was made over the mass in the right rectus muscle, and a large abscess was opened, from which about 300 c.c. of foul pus was evacuated.

The proximal end of the appendix was found leading into the sac. The cavity was drained and partially closed. The temperature immediately rose to 103° F.; marked distension of the abdomen and great distress followed and continued for six days, at the end of which time the fetus was expelled spontaneously. The placenta remained behind and free hemorrhage made it necessary to remove it with placental forceps, at the end of two and one-half hours.

The temperature subsided, and the patient, though very weak, was comparatively comfortable for three days, at which time a low grade of sepsis set in, running its course in about three weeks. During this time the temperature ran an irregular course, ranging from 100° to 103° F. An indurated mass could be felt in the right fornix by vaginal examination, and this gradually disappeared toward the end of the fever.

The drains in the wound were left out after four weeks, and healing was now complete. The patient made an excellent recovery.

The interesting features of this case were: 1. The absence of any history of constipation, either before or during pregnancy. 2. This was apparently a primary attack of appendicitis. 3. The leukocyte count (14,000). 4. The late abortion, six days after the operation, and two weeks after the onset of the attack. 5. The adherent placenta which was attached to the portion of the uterus which formed the abscess wall and thus led to the belief that the abortion was due to a direct migration of the *B. Coli communis* into the placenta. 6. The low grade of the sepsis, which seemed to be due to inter- and intrauterine infection. Three blood cultures during the course of her illness were negative.

DR. ISAAC LEVIN presented a case of

PRIMARY CARCINOMA OF THE VAGINA TREATED BY RADIUM.

The patient, Mrs. G., aged fifty-nine, widow, had one child at the age of twenty-four. On April 24, 1913, she was admitted to the

German Hospital, service of Dr. Seeligmann, where a diagnosis was made of primary carcinoma of the vagina. A piece was excised for microscopical examination which showed a squamous cell epithelioma. The condition was considered to be inoperable and the patient was discharged. For a time she was treated by Dr. Kessler with hypodermic injections of selenium, and on February 27, 1914, she was referred to me by Dr. Seeligmann and Dr. Kessler for radium treatment.

The patient appeared emaciated, weighed 115 pounds, complained of continuous bloody fetid vaginal discharge, constant backache, pain on defecation, rectal tenesmus, painful and frequent micturition. She urinated five or six times every night. On examination the labia and vulva appeared normal with the exception of the presence of a sanguinous fetid discharge. On separating the vaginal walls there was noticed, beginning about 1 1/4 inches from the introitus vaginae, an ulcerated area which circled the whole vaginal wall, but appeared to be deeper on the posterior side. The margins of the ulcer were indurated and the surface consisted of friable tumor tissue, which was very easily detached. The vaginal canal was so constricted by the ulceration that one finger could hardly pass through. As the examination was very painful no attempt was made to determine the upper margin of the ulcer. Rectal examination showed that the mucous wall of the rectum was not involved in the growth and the uterus appeared normal. A narrow strip of soft and apparently normal vaginal tissue was felt between the ulcerated area and the cervix uteri. The right uterosacral ligament appeared thickened, infiltrated and hard, but no lymph glands could be felt anywhere in the pelvis. The inguinal glands were not enlarged.

The patient received eight applications of radium of twelve hours, duration each with an interval of thirty-six hours between the applications. The amount of radium salt used was 50 mgm. The tube was screened with 0.5 mm. of silver, 0.75 mm. of gold and layers of photographic paper to protect against the caustic action of the secondary rays. The whole was enclosed in a sterile rubber tube. At the same time I supported the treatment with massive doses of x-rays in accordance with the technic and by the aid of the apparatus devised by Krönig and Gauss of Freiburg. While the radium was applied directly to the ulcerated area of the vagina, the x-rays were applied through the abdomen and through the back in order to influence not only the vaginal condition but also the uterosacral ligament and any of the glands which it was possible to reach.

In all ten x-ray treatments were given. The rays were applied through four fields on the abdomen and through two fields on the back. Their combined quantity equaled 480 X as measured by Kienboeck photographic strips.

At present the patient has no vaginal discharge, no backaches, no rectal discomfort and no frequency or pain on micturition. She gained 15 pounds and is able to attend to her household duties.

Objectively the vaginal wall presents at a distance of 1 1/4 inches from the introitus vaginae, an annular indurated scar-like mass, the

canal is even more contracted than when the treatment began. The surface of it is smooth and not friable. A piece was excised for microscopical examination throughout the whole thickness of the vaginal wall. The piece was taken from the right lateral wall on one hand in order to be nearer the right uterosarcal ligament and on the other hand not to injure the bladder or the rectum. A microscopical examination of the piece showed absence of cancer tissue, the latter being replaced by a connective tissue and round-cell infiltration.

The condition of the patient is thus greatly improved both clinically and anatomically. The result is the more remarkable and gratifying since the condition was far advanced and inoperable before treatment began. Furthermore the results of operative treatment in cases of primary carcinoma of the vagina are generally poor. The future will show how permanent the improvement will remain.

The paper of the evening was read by DR. ROSALIE SLAUGHTER MORTON, entitled

CONSTITUTIONAL STATES IN RELATION TO GYNECOLOGICAL CONDITIONS.

Dr. Morton called attention to the fact that the surgical treatment of gynecological conditions has been so brilliantly successful in recent years, that a loss of interest was shown in the relation of systemic states to gynecological conditions. Thus many patients are under treatment by gynecologists from whom a previous history of their family or general health has either not been obtained or no attention paid to the same. Dr. Morton believed, however, that the period of overspecializing which has led to exaggeration is now giving way to a more cordial spirit of cooperation, which will result in a more careful diagnostic study of the different lines of approach to a complete diagnosis. The paper was devoted to a comprehensive review of the more frequent systemic conditions which present themselves as complications in gynecological practice. Each is deleterious merely through its association with allied conditions. For example, the bony framework must be normal in form and adjustment, the forward carriage of the head in effecting cerebral circulation interferes with nutrition of the nerve centers and fibers and is a contributory factor toward lowered tone and consequent depression. Thus the dulling of mental alertness leads to brooding on symptoms and nervous instability. Round shoulders by decreasing lung expansion and blood aeration leads to anemia, malnutrition, pelvic neuralgia and amenorrhea.

Dr. Morton considered her subject under several distinct headings the principal features of which were as follows.

Reflex disturbances of the digestion are often attributed to pathological conditions of the genitalia. It has been shown that lessened or suppressed menses are caused only by chronic hemorrhages in the digestive organs. If these lead to anemia or atony of the uterus as the result of general malnutrition they may produce prolonged or

excessive menstruation. Disturbances of the reproductive organs do not exert a reflex influence on the secretory or motile power of the digestive organs, but women of psychoneurotic temperament exaggerate slight gynecologic ailments and as a result of their nervous condition functional disturbances occur in the stomach or other distant organs which disappear as soon as the patient is convinced that her genital disease is not serious or as soon as mental equilibrium is restored through cure. The gynecological effects of alterations in circulation are manifold according to Dr. Morton who stated that although a change in pulse rate and temperature at the menstrual period is claimed by some writers, she had not observed it in normal cases. Moreover, the change in blood pressure occurring at or near a period is not believed to be related to a menstrual rhythm as shown by the observations of Dr. C. D. Mosher. Dr. Morton also called attention to the observations made by Walthard, that pallor and flushes have had too much stress laid upon them as due to pathological conditions of the genital organs as they are frequent in women whose local condition is physiologically and anatomically correct. Loss of blood resulting from diseases of the genital organs may of course produce anatomical changes in the heart wall due to anemia such as would result from pulmonary or other hemorrhages or from chlorosis. Anemia may likewise lead to dilatation of the heart cavities which disappear after the removal of the hemorrhagic uterus or ovarian tumors. Anemia is a frequent cause of painful menstruation due to neuralgia from lessened nutrition and its effect on the blood supply to the pelvic, spinal and sympathetic nerves.

Dr. Morton next discussed the blood picture associated with various inflammatory disturbances including salpingitis, etc., and then took up the consideration of the genitourinary system, calling attention to the necessity of an exact differential diagnosis of kidney prolapse, bladder or ureteral calculi and supernumerary infections. The reader believed that the indefinite pelvic pains of neurotic women are frequently due to an undiagnosed nephritis which may show itself with only a trace of albumen in the urine but which may so lower the nerve-tone of the patient that she has no resistance with which to meet slight intercurrent systemic disturbances and is consequently affected by periodical physiological pelvic congestion which makes no tax on the normal woman. In some of these cases albumen has been ascribed as due to abnormal spinal curvatures and when the latter are treated the circulation of the kidneys is returned to normal and the albumen disappears.

The relation of the nervous system to gynecology has proved a considerable field for much favorable work and also for speculation and Dr. Morton called attention to the fact that failure in accurate diagnosis has caused many women to be branded as neurasthenic. Dr. Morton also called attention to the relation of fatigue incident to the modern industry of women which undoubtedly affects them in a gynecological sense; likewise calling attention to the fact that under proper conditions women can endure fatiguing work almost as well as men. The causes leading to physical inefficiency were believed

by the reader to be not related to the sexes but rather to excessive hours of labor in improper surroundings. The influence on the genital organs of nontoxic doses of various poisons including arsenic, phosphorus and lead, together with alcohol and other narcotics was then referred to, likewise the effect of acute infectious diseases.

The relation of diseases of the eye, ear and nose to the female genital organs, and the reflexes, present according to Dr. Morton many interesting points which are outside the field of systemic disturbances as presented in her paper, but they should always be taken into consideration as the causation of possible complications, diagnosis of which can only be properly made in conjunction with specialists in these fields.

The ductless glands are believed by Dr. Morton to present the most interesting division of the subject of the relation of systemic states to gynecological conditions. Referring to the internal secretions of the ovary, Dr. Morton thought that the relation of the symptoms commonly observed in certain cases and ascribed as due to disturbances in the action of the ovarian hormones, was not at the present time distinctly elucidated. The relation of the ovaries to growth, osteomalacia, chlorosis and anemia were next discussed, likewise the secretions of the mammary glands and hypophysis, also the suprarenal bodies. This portion of the paper cannot be satisfactorily abstracted.

TRANSACTIONS OF THE MEDICAL SOCIETY OF THE COUNTY OF NEW YORK.

Stated Meeting, Held May 25, 1914.

The President, DR. T. PASSMORE BERENS, in the Chair.

The evening was devoted to the discussion of the Bacillus coli which was considered under the following headings:

CULTURAL CHARACTERISTICS.

DR. WILLIAM C. THRO presented this communication and gave a lantern slide demonstration. He asserted that it was indeed surprising the number of pathological lesions that might be caused by this common bacteria. When injected into small animals death from septicemia usually followed in a short time. Rabbits might recover but with an atrophy of the posterior limbs due to lesions in the spinal cord. Among other lesions may be mentioned peritonitis, endocarditis, pleurisy, meningitis, inflammations of the genito-urinary tract, and the bacilli may even be found in the sputum in lobar pneumonia. The colon bacillus has always been of interest to the bacteriologist because of its relation to the typhoid group, but as its occurrence as a disease producer became better known it

assumed importance to the surgeon and to the physician. The use of vaccines had also caused its recognition to rise in importance as well as its value as an indicator of the fecal contamination of water. This bacillus is a member of the great group of Gram negative rods including typhoid, paratyphoid, and Freidlander's pneumo-bacillus. Some bacteriologists state that it is motile, but the most that the essayist had studied had been but slightly motile if at all. From recent experiments it had been shown that it was very difficult to demonstrate flagellæ in the colon bacillus, more so than in the typhoid organisms. When they were present they were fewer in number and shorter than the flagellæ of the typhoid bacillus. The production of indol in Dunham's peptone after forty-eight hours' growth was one of the most valuable characteristics by which it might be separated from the *B. typhosis*. It was also distinguishable from the typhoid organism by a more abundant brownish growth on potato media. Its great power as a fermenter of lactose in litmus milk and lactose agar furnished one of its most valuable differential characteristics. Within recent times the carbohydrates had furnished the most valuable substances in the separation of some of the bacteria. They have been used extensively in the separation of the membranes of the typhoid colon group. By the use of the carbohydrates the colon group itself had been separated into many subgroups. It might be that one was derived from the other, indeed one investigator had induced a typhoid strain to ferment lactose, and Rosenow had recently demonstrated the variability of the streptococci. Among the new differential media might be mentioned that of Conradi and Drigalski in which the colon colonies appear red and the typhoid and paratyphoid blue. Another of these media is neutral red in which the colon bacilli produced gas and removed the color, or reduced it, while the typhoid and paratyphoid did not so behave. In Eudo's media the colon colony was bright red and the typhoid colorless. In McConkey's bile salt lactose the colon bacillus was crimson while the typhoid was not. Some of the latest work had been along the line of substances that inhibited the growth of the colon bacilli but allowed the typhoid and paratyphoid to grow, like malachite green, and a still later modification by Torrey who used brilliant green. Of the materials sent to the laboratory for examination for the *B. coli* the urine is most common. The specimen should be sent in a sterile bottle, and preferably should be obtained by catheter. Usually all the media mentioned are not employed, but they are content with a Gram stain, presence or absence of motility, the indol test, litmus milk, the Conradi test, and lactose litmus agar. From personal experience the essayist felt convinced of the value of vaccine therapy in colon infections of the genitourinary tract.

BACILLUS COLI INFECTIONS IN INFANCY AND EARLY LIFE.

DR. MORGAN W. HARTSHORN.—First to be considered are infections of the brain. Although many text-books mention the *Bacillus coli* as an etiological factor in meningitis, yet there are few authentic

cases reported. Smith of London has collected thirty-two cases and to these may be added one case that Dr. Nicoll has observed and one case which occurred at the Nursery and Child's hospital several years ago. These cases were mostly all young babies, the condition being secondary to inflammations of the intestinal tract, navel, or bladder, otitis media, or spina bifida. Smith concludes that there may be either a serous or suppurative meningitis. The symptoms are undeterminable from other forms of meningitis. The prognosis is not invariably fatal.

In the respiratory tract the *Bacillus coli* is rarely the only cause of inflammatory processes. It has been found in pure culture in the sputum of patients suffering from pneumonia according to the case reports of Meara and Niles. At the Rockefeller Institute and at the Research Laboratory of the Board of Health there were no case records of pneumonia caused by the *Bacillus coli* alone.

In hemorrhagic septicemia of the newborn, or Winckel's disease, a generalized *Bacillus coli* infection has been found. This disease is characterized by marked prostration, vomiting, diarrhea, cyanosis, and intense general icterus. The urine passed is small in amount, smoky in color, and contains hemoglobin. There is usually a fatal termination. In six cases reported by Wolczynski the infection was supposed to have been conveyed by infected spring water used for cleansing the mouth.

Dr. Anna Williams has reported several cases of acute catarrhal conjunctivitis in which a colon bacillus was found in nearly pure culture.

In disease of the intestinal tract it seems useless to try to discriminate between the *Bacillus coli* and the many associated organisms of the colon group. It has not been proved that the bacillus coli, *per se*, is responsible for the many forms of intestinal disturbances. As Zinsser says, "whereas the *Bacillus coli* may aggravate morbid processes by the formation of gas, in an excessive carbohydrate diet, they do not of themselves take part in actual putrefactive processes. In most intestinal diseases they actually play but a secondary part."

There is a most interesting group of cases resulting from an infection of the urinary tract by the *Bacillus coli*. In children this condition is most common during the first two years of life and the majority of cases are in girls. This may be due to the anatomical fact that the short wide urethra of the female may become infected more easily than that of the male from soiled genitals.

The modes of infection are descending by the blood through the kidneys, ascending through the urethra, and transparietal or by contiguity through some lesion of the intestinal mucous membrane. There may be a bacilluria characterized by the presence of the *Bacillus coli* in the urine, which is highly acid. There may be a lack of all constitutional symptoms. Sometimes there is enuresis and a marked anemia. Or, again, there may be a pyelitis accompanied by marked constitutional symptoms, often associated inflammations of the intestinal tract, large or small amount of pus in an acid urine,⁶ high or low fever of the remittent type, protracted in course.

There may also be suppurative pyelonephritis, a most severe form of infection, with multiple abscesses of the kidney, pus in the urine, more marked constitutional symptoms, chills, and fever. In such cases recovery is rare. These conditions doubtless explain many of those cases of obscure high fever which formerly were associated with malaria or typhoid fever.

The mild cases recover with little or no medical attention. As a rule the treatment must be continued for a long time as the condition has a tendency to recur. A diet suitable for increasing fluids should be given, alkalies, as potassium citrate in increasing doses, sodium phosphate as a laxative, and urotropin from six to sixty grains a day with sodium benzoate. For the liberation of hydrochloric acid the urine must be acid and for this purpose hydrochloric acid may also be used. The dosage must be small at first and the child carefully watched for any sign of kidney irritation, albumin or blood in the urine. Various reports have been made regarding the vaccines. The dosage is from ten to one-hundred million at four- or five-day intervals.

COLON BACILLUS INFECTIONS OF THE KIDNEY.

DR. HENRY D. FURNISS.—The colon bacillus is found in such a large majority of renal infections that the finding of other organisms in culture is regarded as a fault in technic unless the colonies are numerous. In considering this subject an endeavor will be made to answer some of the questions that require answer.

Why are the urinary organs so susceptible to the colon bacillus?

The tissues of the body have a certain tolerance or immunity to different infections, gained by harboring the infectious organisms for shorter or longer times. Again, resistance of certain tissues to certain organisms is inherited. A tissue without this inherited or acquired resistance is very susceptible. Germs perfectly harmless on the intact mucosa of the mouth are actively destructive to the serosa of a joint. Since the origin of man he has probably harbored the colon bacillus in the intestinal tract, and yet with all this inherited immunity, the new-born child, whose intestines have been sterile until birth, at times shows susceptibility to this organism. Furthermore there are some two hundred strains of the colon bacillus, and it does not follow that immunity to one strain confers immunity to all the others. Again it has been proven that the colon bacillus can change its type. This accounts for some of our back-sets and relapses. At no time have the urinary organs been the natural habitat of the colon bacillus, and its introduction upon such a virgin soil is generally attended with an inflammatory reaction, especially if some of the predisposing factors to be mentioned are present.

What are the predisposing factors?

Conditions causing obstruction with retention and lack of drainage predispose to infection. Most prominent of these are urethral and ureteral obstruction caused either by organic strictures, or pressure of

growths, malposition of genital organs, pressure of the pregnant uterus, retention due to spinal cord lesions, ureteral kinking from movable kidney, etc. Stones in the kidney cause congestion, abrasive lesions, and at times urinary obstruction. Factors lowering the vitality of the body in general and the urinary tract in particular, such as depressing illnesses, congestions of the kidney from toxemia and exposure to cold, render the kidneys more susceptible to infection. The greater frequency of infection of the right kidney is probably due to its greater mobility.

What are the exciting causes?

Among the exciting causes may be mentioned infectious foci such as furuncles, carbuncles, tonsillitis, abscesses, infected wounds, scarlet fever, whooping cough and intestinal diseases, as diarrhea, constipation, Hirschsprung's disease, typhoid, paratyphoid, and appendicitis. Most of these conditions are due to other bacteria, but the infections pave the way for the colon bacillus.

How does it gain entrance?

On this subject there is much discussion, and at present the evidence is not sufficient to determine with certainty the method of infection. Even in bladder infections there is divergence of opinion, some believing that the cystitis is due to an extension upward along the urethra, while others consider all cystitis as secondary to renal involvement.

The preponderance of opinion is in favor of hematogenous infection in the greater number of cases; lymphatic extension in some, and ascending infection in few, if any. To my mind most of the renal infections are due to the breaking up of infected thrombi that find lodgment in the kidney where they develop. The kidney is capable of eliminating many bacteria without being damaged, but factors which cause undue congestion and faulty drainage favor its infection. At the last meeting of the American Medical Association I reported nine cases of postoperative renal infection, most of which were of colon bacillus origin and followed from a few to several days after operations upon or near the intestinal tract. A point in favor of these being of hematogenous origin is that pus is seldom found in the urine in the first two or three days of the infection. This seems to indicate that the renal parenchyma is first infected and the pelvis secondarily.

What is the natural course of these infections?

There are two classes of cases, those in whom the onset is gradual and in whom it is almost impossible to determine when the infection took place and those in whom it is acute. It is essential to determine the infectious organism, as the colon bacillus cases usually recover without operation, while the fulminating type due to streptococcus and staphylococcus often demand a prompt nephrectomy. These cases are usually over their acute symptoms in from five to twelve days. The recovery is complete or they persist as a pyelitis. Pyelitis cases have exacerbations which are brought on by conditions causing congestion or interfering with pelvic drainage. This interference with drainage may occur from congestion narrowing the ureteral lumen, or be due to prolapse of the kidney, bow-stringing of the

ureter over an anomalous blood-vessel or plugging of the ureter by stone. With the recurrence of these attacks there is an increasing dilatation of the renal pelvis and atrophy of the parenchyma, which in the course of time converts the kidney into a functionally worthless organ.

Another type of infection shows ulceration of the tips of the papillæ, with no dilatation of the pelvis. This form is actively destructive and not very amenable to palliative treatment. There is still another type in which the kidney is converted into several large pus sacs. Usually patients with this form show evidence of sepsis, and as the diagnosis is usually not made for some time they become very much run down and emaciated.

In treating the acute hematogenous form of infection the patient is put to bed, given large quantities of water, urotropin fifteen grains every six hours, and, if the urine is not acid, in addition, twenty grains of acid sodium phosphate three times daily, but not while giving the urotropin. Salol is another remedy of great value, and in some cases works better than urotropin. The lumbar region is dry-cupped once or twice daily, and an electric pad applied continuously. Temperature above 102° F. is controlled by alcohol sponging. After the subsidence of the acute symptoms autogenous vaccines are of benefit not only in accelerating recovery but also in increasing the patient's resistance so that recurrence will be prevented. In the pyelitis cases we attempt to give proper support to the kidney by bandaging and corseting; administer salol or urotropin; give large quantities of water, inject autogenous vaccines, and build up the general condition. If this does not suffice the pelvis of the kidney is irrigated with $1/2$ to 1 per cent. silver nitrate every five to seven days. At the same time search is made for the primary infecting source, and it is eradicated. The combined functional capacity of the two kidneys should be determined, and then the relative. For the combined function I prefer phenosulphonaphthalein. To determine the relative capacity I give 10 c.c. of a three-tenths of 1 per cent. solution of indigo carmine intravenously, and then observe the elimination from the two ureters through an observation cystoscope. If it is determined that the combined function is good and that one kidney is functionally greatly damaged, then this damaged kidney had best be removed.

For the ulcerative and pus kidney, nephrectomy is best, and drainage if this is impossible.

In many cases of arthritis the focus of infection is to be found in colon infection of the kidneys, and treatment of the renal infection will materially benefit the joint condition.

Our best results with vaccines have been obtained in the cases where there was an involvement of the renal parenchyma. In the cystitis cases they have been of some value and are useful adjuvants. Stock vaccines are of little or no benefit, and autogenous vaccines must be used. If the patient is taking urotropin, this may have to be discontinued for twenty-four to forty-eight hours, or

the bacilli will not grow, even though they may be seen in the urine microscopically.

THE BACILLUS COLI INFECTIONS DURING PREGNANCY AND THE PUERPERIUM.

DR. FRANKLIN A. DORMAN.—It is a fact constantly receiving wide recognition that the colon bacillus of itself or in association with other germs, is a not infrequent element in disturbances during or immediately following gestation. The intimate association of the intestinal tract with the generative tract, when taken in mind with digestive disturbances in pregnancy, is responsible for the peculiar colon bacilli infections which are met with. The normal mechanics of intestinal action are obviously at times much disturbed by the growing uterus. In this condition all extremes are encountered from simple inability of the woman to empty her rectum because she cannot properly apply her muscular powers to such extreme conditions as partial or complete obstruction from volvulus or intestinal bands. Any disturbance of the integrity of the intestinal mucosa furnishes the possible occasion for extension of the colon bacillus from its natural habitat, and may result in the complications under discussion.

Taking up the disorders in the order of their frequency we first consider pyelitis. The common association of pyelitis with pregnancy shows clearly that the gravid state predisposes to this condition. The entrance of infection is variously given as ascending direct, by the lymphatics or by the blood channels. That pressure of the gravid uterus aids in localizing the lesion is shown by its occurrence in the great majority of cases in the pelvis of the right kidney, the side to which the womb is usually deflected during the later months of pregnancy. Ascending infection may be caused by improper bladder drainage due to distortion of the base of the bladder by the growing uterus. In the large percentage of pyelitis cases the colon bacillus is the offending germ. The time of occurrence is rarely in the early months.

The onset may vary from slight and transitory attacks of lumbar tenderness, mild febrile symptoms, with pus in acid urine, to the type of case with severe pain, recurrent chills with high fever, rapid pulse, and considerable prostration. The first recognized symptoms of pyelitis may appear in the puerperium, here if a careful analysis of the history is taken one is forced to conclude that most of these cases have had an antepartum existence. Doubtless a few instances of ascending infection in catheter cases may be of strictly puerperal origin. The general practitioner and the obstetrician must become more alert to detect pyelitis. A point in diagnosis well worth noting is that during the fever and acute pains there may be brief periods of time during which pus is absent from the urine, but this is followed by the passage of large amounts of pus, with relief of symptoms. Another suggestion in diagnosis not yet verified by me is the statement that the urine has a characteristic odor. This may be due to

the colonic bacilli odor modified by the normal odor of urine. Sometimes renal pelvic infection is found with puerperal infection, in fact has probably been a causal infection, thus adding complexity to the diagnosis. Pyelitis in pregnancy rarely goes into infection of the kidney parenchyma. The termination of pregnancy favors its entire cure, but this does not seem to be a necessary therapeutic resort. Active treatment of the condition consists first in postural treatment, the patient being kept in the recumbent position and most of the time on the side away from the infection, with the elevation of the head of the bed. Pain and fever are relieved by an ice-bag to the lumbar region involved. Occasionally a sedative may be necessary. Forced fluids are important in assisting drainage. A diet of buttermilk or pasteurized milk is recommended, and liberal doses of urotropin have seemed of value in diminishing the severity of the bacilli. Intestinal treatment must not be neglected. If the infection be persistent autogenous vaccines will be of value. In obstinate cases irrigation is usually curative.

Appendicitis coincident with the pregnant state is usually a colon bacillus affair. Primary appendicitis is of unusual occurrence, but the recurrent form is exceedingly likely to be stirred into activity by the growing uterus, possibly due to the stretching of old adhesions. This form of attack is usually of the catarrhal variety, and is not likely to cause serious trouble. The suppurative or perforating forms of appendicitis are more dangerous than to the normal patient, the danger increasing the nearer the attack approaches labor. There is greater difficulty in securing drainage of abscess formation, and greater likelihood of thrombophlebitis. The onset of labor adds to the peril in that the type of labor is painful with poor quality of uterine contractions. Again the uterine wall may be part of the abscess sac, and its contraction and shrinkage may cause rupture of that sac into the general peritoneal cavity.

An acute appendicitis with onset in the puerperium is apt to be severe. Diagnosis is sometimes masked with other symptoms. Rigidity and location of tenderness is not so definitely marked.

As to treatment, the woman with a chronic appendicitis who desires to be fit to bear children has an additional reason for the removal of her appendix. Statistics prove that should she conceive, the chances are greater than ever that the appendix will give her trouble. An acute appendicitis, whether fresh or an exacerbation of a chronic appendicitis should be operated upon during pregnancy whenever discovered. Temporizing is most dangerous. If pregnancy is advanced the incision should be high. Every effort should be made to avoid the onset of labor. This may be accomplished by the liberal use of opium. In case acute appendicitis is coincident with labor, the safest resort in the presence of pus would be a Cesarean section, with a Porro operation, and pelvic drainage.

Dr. De Lee, in his recent text-book makes the statement that pregnancy seems to be a feature in the development of gall stones. One may at any time meet infection of the gall bladder, and the common association of icterus with this complication, as well as the

hepatic degeneration of toxemia, may cause some difficulty in the differential diagnosis. Active and severe symptoms may call for operation at any time. A. B. Davis claims that pregnancy forms no contraindication to the operation. At or near term the uterus may by its position cause some mechanical difficulty during the operation. During labor a distended infected gall bladder might rupture. Postpartum cholecystitis may be confused with or mistaken for puerperal sepsis.

The puerperal, that is the uterine infections of most varied types will not infrequently give evidence of colon bacilli origin or participation. Extrusion of fecal matter during the last stage of labor, associated with intrauterine or vaginal manipulation, is the common source of inoculation. Tamponade of the uterus has been noticed as one cause of infection with colon bacilli. Especially in cases where there has been a tear involving the sphincter is such infection likely. It has seemed to the writer that in some cases the infection is due to infected urine. The colon bacillus may be in association with other pus germs, when the virulence seems to be enhanced.

The colon bacillus infection is more apt to develop metastases and parametric abscesses are common. Its tendency seems to be to localize. A suggestive symptom is the fetid odor of the lochia. Prevention is most important in dealing with puerperal infection. As far as the colon bacillus is concerned, the use of cleansing enemas during labor, and the careful washing away of fecal matter during the perineal stage, is essential. Any intrauterine manipulation should be conducted with the greatest care against fecal contamination. Examples of divers effects of colon bacilli infection mentioned as curiosities, are coincident tubal infections, breast abscesses, colon infections of ovarian cysts or of degenerative fibroids. There are also authentic cases of navel infection and pyemia of the newly born from the same cause.

GYNCOLOGICAL CONDITIONS DUE TO THE BACILLUS COLI.

DR. WILLIAM E. STUDDIFORD presented this phase of the subject. In regard to the frequency of colon bacillus infection, he stated that Foskett had reported thirty-four cases in three years prior to 1914. Ten of these were cases of pyelitis and cystitis without operations and thirteen puerperal cases, in eleven of which the colon bacilli were found in the urine; in one case they were found in the blood, and in another in a cyst of the ovary following hydatid mole infection with the colon bacilli. After three abdominal sections the colon bacilli were found in the urine. Colon bacilli infection was found in one interposition operation for prolapse in this series and in six cases of pelvic or ovarian abscess. Some of the diagnostic points were abdominal pain localized to the infected section, a high leucocyte count, polymorphonuclear count about 80 per cent., cloudy acid urine which might be confused with the typhoid appearance. Examination of the urine of 139 cases admitted to the hospital since January 1, showed 92 sterile, 28 infected with the colon bacilli, 14

with streptococcus, 3 with staphylococcus, and 2 with tubercle bacilli. Of the colon cases 3 were pregnant with high temperature and pyelitis; 1 was a case of pyelitis and 1 of pelvic abscess. A culture should be made in all suspicious cases as an aid in prognosis and for the benefit of the patient. A plan of treatment that would be an aid in lowering the morbidity from this cause was the giving of high colonic irrigations and urotropin and soda benzoate in large doses for several days before and after abdominal and plastic operations. A buttermilk diet should also be given and iodine should be used in pelvic operations. The essayist concluded that: 1. Infection by the colon bacillus was a distinct condition in gynecological and obstetrical cases; 2. pyelitis infection might be confused with typhoid fever, appendicitis, salpingitis, or puerperal sepsis; 3. cultures of urine should be made in all doubtful cases and in hospital practice every case admitted should have a bacteriological examination of the urine made.

DISCUSSION.

DR. EDWARD L. KELLOGG discussed the subject from the standpoint of the internist. He said that the symposium had been most interesting and instructive. If he had given the subject more consideration he would have declined to discuss it since the clinician could hope to present little of value, when there were such able pathologists working on it. It was to the work of Herter that he was particularly indebted for his limited knowledge of the subject. As a gastroenterologist he had found it desirable to consider the *Bacillus coli* not as a distinct entity but in connection with the allied or antagonistic bacteria found in the intestinal tract. Without doubt it furnished one of the strangest defenses against the action of the other less desirable inhabitants of the intestinal tract, but apparently it was necessary to keep it in its natural environment if the individual was to be protected against its injurious effects. Turck had shown several years ago that it might bear an important relation to the production of duodenal ulcer, and in a series of experiments which the speaker had conducted during the past two years he had frequently found it in the duodenal fluid of cases of duodenal ulcer and gall bladder infection although usually absent under other conditions. It had seemed to him that in those cases in which he had been obliged to combat the activities of the bacillus coli the primary trouble had been an intestinal stasis and this had proven true in several cases of bacillus coli infection of the kidneys that resisted treatment until the stasis was relieved or controlled. In the colon they were all agreed that the *Bacillus coli* with its allies the *B. lactis* and *B. aërogenes*, and *B. bifidus*, exerted an inhibitory effect upon the activities of such bacteria as the *B. aërogenes capsulatus* and other putrefactive anerobes. It seemed to have been demonstrated by Herter, however, that when the putrefactive anerobes had succeeded in commencing the destructive work on the proteids, the *Bacillus coli* group might then join them in producing

putrefactive products. However, in cases in which the putrefactive anerobes had largely replaced the *Bacillus coli* group results had followed the introduction of cultures of *Bacillus coli* into the colon. Clinically, in the study of cases showing abnormal activity of the intestinal flora, a proper realization of abnormal mechanical conditions in the intestines was essential, and the treatment was in large part the relief or control of such mechanical defects.

BRIEF OF CURRENT LITERATURE.

Regeneration of the Uterine Mucosa after Curetting.—Richter (*Gyn. Rundsch.*, 1914, No. 2) presents a study based on a series of eighteen cases in which the uterine mucosa was submitted to histological examination after curetting at periods varying from one to twenty-six days before hysterectomy. It is necessary to distinguish the processes of regeneration in cases that have been superficially curetted from those that have been deeply curetted. During the first few days after curetage the conditions are practically the same in both procedures and the surface is merely coated with a layer of fibrin. After superficial curetting, restoration of the membrane occurs as early as the fifth day; whereas, in those cases in which more pronounced scrapping has been done, epitheliation is not complete until the ninth day. The epithelium is derived from the remnants on the surface or glands and proliferates over the raw surface from these points. As early as the third day delicate vessels of fibroblasts may be found and the latter were demonstrated as late as the twenty-sixth day. This is followed by the formation of true glandular tissue from which the connective tissue is formed, fibers of which have been observed by the fifth day. Regeneration of the glandular elements in the pronounced curetage was not found completed two days later, but only a few depressions could be demonstrated from which the glands are undoubtedly developed later. In the superficial curetting the new glands are formed early from the remnants of the previous structures. The entire process of regeneration is therefore similar to the formation of the mucous membrane after labor and menstruation, especially in those cases where the superficial curetting has been done. These findings were controlled by operations done in dogs where the curetting was done through a laparotomy wound and the uterus extirpated later on. The results practically confirmed those in the human subject.

An Unusual Case of Vicarious Menstruation.—Hirschberg (*Zentralbl. f. Gynak.*, 1914, No. 26) reports a case in which regular menstrual periods were accompanied by a passage of blood from the breasts. The patient, twenty-seven years of age with a negative previous history, began to menstruate regularly at eleven years of age. From the fifteenth year on the breasts secreted a watery

fluid at the time of menstruation and after the seventeenth year this discharge became bloody. It usually began a day or two before the genital flow and was accompanied by pain in the glands. It continued for six or seven days after the flow from the vagina. The patient aborted twice and during the pregnancy the blood from the breasts was not observed, but returned soon after abortion occurred. After the last pregnancy, however, the bleeding from the breasts ceased quite suddenly and has not returned. Only two cases of this kind have thus far been reported. In one the bleeding from the breasts occurred after a hysteropexy with castration, and in the other it was also vicarious.

The Treatment of Peritonitis with Camphorated Oil.—Hüffel (*Monatschr. f. Geburtsh. u. Gynäk.*, June, 1914) summarizes the literature on this subject which has accumulated since the introduction of the method about eight years ago. It was originally believed that the oil simply blocked the afferent lymphatics and in this way diminished the absorption of bacteria. After Glimms first published the method, Hirschel reported nine cases of peritonitis treated by injections of camphorated oil of which four died, although in all patients a well-marked improvement in the abdominal symptoms resulted. Two of the deaths resulted from peritonitis. Kreke treated eleven cases of purulent peritonitis following appendicial perforation with complete recovery. Hoehne subsequently confirmed the earlier findings by animal experiments and reported 120 cases in which the method was used with varying results. Most patients did not experience any pain and marked changes in temperature or pulse rate was not observed. In these cases the oil was injected before operation because the danger of infection was present from a number of sources. Since then several authors have reported series of cases thus treated with excellent results. Hoehne subsequently reported a series of 271 cases thus treated, including various pelvic and other infections. Among these were two deaths which could clinically be ascribed to septicemia. He recommended a postoperative injection in addition where purulent processes in the peritoneal cavity were found, but warned against its use in a general purulent peritonitis. Several well known operators have not agreed with Hoehne's findings and many have warned against its use. It is difficult because of this conflicting testimony to express an opinion regarding the value of this treatment. The most favorable field of application seems to be in those cases where infection is suspected, and particularly where carcinoma is present a favorable effect seems to have been found.

The Stimulating Effect of the X-rays in Chlorosis.—Fraenkel (*Zentralbl. f. Gynäk.*, 1914, No. 26) presents a brief report on the favorable effects of radiation treatment directed to the thyroid gland. He believes that the effect is two-fold, the ovaries are stimulated and strumous conditions likewise benefited. He presents an illustrative case of a woman thirty-four years of age who had previously had regular periods. A gradual increase in the thyroid region resulted and the periods became weaker and less frequent.

To this was added palpitation and exophthalmos, together with further evidences of a well-marked case of Basedow's disease. Menstruation finally ceased entirely and the patient lost considerable in weight and strength. A thyroid tumor was removed and the periods slowly returned about six weeks after operation and continued regularly. The palpitation and restlessness together with the exophthalmos and rapid pulse did not entirely diminish and about a year later the thyroid again began to grow followed by a cessation of menstruation. Radiation treatment was then instituted and within a few months menstruation was regular and the symptoms had improved. The author believes that ovarian disturbance is the basis for many cases of chlorosis and reports five additional instances in which the blood picture improved after eight treatments without the administration of any other medicament. He considers that these results indicate a new field for the application of the Röntgen rays.

The Etiology of Endogenous Puerperal Infection.—Seligmann (*Zeitschr. f. Geb. u. Gyn.*, Bd. lxxv, Hft. 3) has collected a series of 1092 cases from the gynecological clinic at Frankfort of Prof. Walther, for the purpose of determining the prognostic value on the course of the puerperium by the demonstration of streptococci in the vaginal secretions. The examination was negative as regards the finding of streptococci in 517 cases (43.3 per cent.), nonhemolytic streptococci in 532 cases (48.7 per cent.) and hemolytic streptococci in 43 cases (3.9 per cent.). In 982 cases, spontaneous labor with a narrow pelvis resulted. In thirty cases, spontaneous labor with a narrow pelvis, in thirty-five cases, breech presentations with manual extraction, and in forty-five, operative deliveries through the natural passages resulted. Among 517 cases in which no streptococci were found, temperature occurred during the puerperium in forty cases (7.3 per cent.) and among 575 women with positive finding of streptococci, a rise of temperature occurred in forty-six cases (8 per cent.). As compared with a similar series of cases studied a year before it would appear as if the prognosis of the puerperium was entirely independent of the presence or absence of streptococci in the secretion from the lower third of the vagina. In all these cases the examinations during labor were conducted entirely through the rectum.

Bacteriological Findings in Temperature after Delivery.—Werner and Zubrzycki (*Zeitschr. f. Geb. u. Gyn.*, Bd. lxxv, Hft. 3) present an extended series of observations based on 200 cases in which temperature occurred after labor in whom the cervical secretion, and in severe cases also, the blood was subjected to bacteriological examination. In 91 per cent. of the cases the cervical secretion contained streptococci, among which 61 per cent. were of the hemolytic variety. In 51 per cent. of the cases these were secured in pure culture and in 40 per cent., mixed with other organisms; whereas, the staphylococcus were found in only 28 per cent. and the colon bacillus in 18 per cent. of the cases. In sixty-one patients in whom a blood examination was made, a positive result was obtained in only nine, eight of which presented an infection by the hemolytic streptococcus and in one an anerobic streptococcus was found. No practical

significance attaches to the bacteriological findings as regards the treatment. The prognosis likewise could not be related to the bacteriological findings even in the presence of a bacteremia. Although these methods are of no great value for the practitioner, the findings thus obtained are of great scientific moment and should always be obtained whenever possible.

Molding of the Fetal Skull in Deformities of the Pelvis.—Walcher (*Zentralbl. f. Gynäk.*, No. 22, 1914) calls attention to the well-known fact that labor in cases of narrow pelvis is apt to terminate more quickly in primiparæ than in multiparæ. It has been assumed that the smaller child in the primipara is the cause of this, or the greater frequency of vertex presentations due to the more rigid soft parts and the more muscular uterus. Another factor is, however, of importance to which attention has rarely been called, viz., that in cases of narrow pelvis, the head is often found deeply engaged in the pelvis toward the end of pregnancy without labor pains having been present. Walcher found that in the majority of cases where the head was not engaged six weeks before labor, where narrow pelvis was present, it was invariably firmly engaged at the time of admission. In such cases the expulsive stage was usually rapid and very little overriding of the fetal skull bones was present, although the shape of the skull might have been very much changed and represented in its cross-section the exact shape of the pelvis. He assumes that this may be explained by the fact that the skull of the child during the latter weeks of pregnancy has assumed the shape of the pelvis during its engagement. In such cases, moreover, no depressions were present.

A New Method for the Treatment of Retained Placenta.—Gabaston (*Münch. med. Wochenschr.*, March 24, 1914) in calling attention to the dangers attached to the artificial separation of a retained placenta proposes the following procedure. A canula is firmly attached to the vein in the umbilical cord, and through this sterile physiological salt solution injected under slight pressure with a rubber bulb. By this means the vessels become distended and finally the smaller vessels of the chorionic villi are ruptured by the pressure of the injected fluid. This causes the formation of a retroplacental hydroma and the latter causes the placenta to separate from the uterine wall just as a retroplacental hematoma would. The author reports one case in which the method was used where the placenta failed to be delivered after one and one-half hours' waiting and a complete atony of the uterus was present. Within seven minutes after the injection was started, satisfactory uterine contractions resulted and within twelve minutes the placenta was born in the usual way.

The Etiology and Treatment of Hyperemesis.—Bondy (*Monatschr. f. Geburtsh. u. Gynäk.*, June, 1914) has studied a series of twenty-one cases of hyperemesis which occurred in Küstner's Clinic at Breslau, in two of which he was able to study the autopsy findings. In one very severe instance the patient was successfully treated with injections of normal pregnancy serum although the manner of this

treatment is believed by him to be still without explanation. Bondy is inclined to believe, however, that in hyperemesis we are dealing with a toxemia to which psychic or reflex causes have been added. The pathological findings at autopsy, however, cannot with certainty be ascribed to an intoxication, nor does he deny this. In view of the successful results, however, which have been reported in a moderate number of cases, Bondy advises the use of the serum because of its general freedom from danger. Functional disturbances and anatomical lesions are not necessarily associated, for very severe disturbances of the kidney are found in which very little anatomical change has occurred and this also applies to functional disturbances in the liver where no demonstrable lesions are present. Bondy suggests that possibly the hyperemesis of pregnancy is traceable to disturbances in the domain of the internal secretions.

In view of the findings associated with the Abderhalden test we may assume that shortly after conception takes place, substances circulate in the maternal organism which may be regarded as foreign matter. These substances under certain circumstances, not yet determined, are capable of upsetting the perfect balance of the organism which among other things may be marked by vomiting. The activity of these substances in the organism is to be traced either to their increased formation or the diminished combination with antidotes, resulting in a condition of toxemia. Their effect may be subsequently increased by psychic influences, neuropathic disposition or pathological processes in the genitals themselves.

A Method for Increasing Diuresis in Eclampsia.—Lichtenstein (*Zentralbl. f. Gynäk.*, 1914, No. 23) referring to the necessity of rapidly eliminating the toxins from the body, recommends the intramuscular injection of a preparation known as euphyllin. This is a combination of theophyllin with ethylenediamin which is soluble in water and contains 78 per cent. of theophyllin. Although it is difficult to judge the effect of this procedure, Lichtenstein is able to report five cases in which it was employed. On one a severe oliguria was present and only 10 c.c. were secreted during a period of five hours. Venesection was done and no further convulsions occurred, but notwithstanding the injection of 800 c.c. of salt solution only 100 c.c. of urine was excreted during the next fifteen hours. After the intramuscular injection of 4 c.c. of euphyllin in two equal doses, the urinary secretion during the next seventeen hours amounted to 1070 c.c. This improvement took place before labor and the albumen content likewise diminished from 17 per cent. to 1/2 per cent. In the second case the convulsions were likewise controlled, but only 140 c.c. of urine was passed in nineteen hours. After an injection of a similar amount of euphyllin the urinary secretions in fourteen hours rose to 400 c.c. and on the next day the administration was further continued. This patient was subsequently delivered, but as in the previous case, the urinary secretion increased before delivery. In three additional cases the results were less satisfactory but an improvement was nevertheless noted in the urinary secretion. It is to be noted that in no instance did any harm result either to the mother

or the child. The intramuscular injection is preferable because less painful and absorption is more rapid. Euphyllin may also be given in tablets or solution by mouth and in suppositories or rectal enemas. The remedy may also be employed in cases of toxemia of a less acute degree, likewise in the nephritis of pregnancy and broken cardiac compensation. In such instances the addition of digitalin is advisable. The method must be subjected to further tests before a definite conclusion can be drawn.

Oil of Turpentine in the Treatment of Puerperal Sepsis.—Cramer (*Monatschr. f. Geburtsh. u. Gynäk.*, June, 1914) states that for the past ten years he has used the oil of turpentine in the local treatment of puerperal infections, employing the undiluted officinal oil in the form of a tampon to the infected mucous membrane of the vagina and wiping out the cavity of the uterus likewise. The absorption of the oil is very slight and the writer claims that no unfavorable symptoms are observed. In all cases it is necessary to completely free the uterus of all placental and decidual remnants, avoiding a sharp curet. The results in a considerable series of cases are presented and even where sloughing has already occurred, the healing process is favored. The author also employs the oil of turpentine in gynecological treatment, especially in the presence of cervical and vaginal infection with streptococci and staphylococci. It also serves as a satisfactory prophylactic for disinfecting the vagina previous to abdominal hysterectomy for carcinoma.

Eye Changes in Pregnancy and Labor.—Adam (*Monatschr. f. Geburtsh. u. Gynäk.*, June, 1914) discussing the subject of retinitis in pregnancy, presents the results of his observations in ninety-two cases of eclampsia of which forty-four presented visual disturbances. Only four of the latter presented evidences of a retinitis and here the excretion of albumen continued after delivery; whereas, in the other cases it diminished rapidly. In the majority of the cases complete amaurosis and in a smaller number a well-marked amblyopia was present. In all cases a prompt reaction of the pupils was present, showing that the disturbances were probably cerebral in character although the ophthalmological findings were normal in thirty-six cases. Ex-ophthalmic changes were noted in four cases which were somewhat unusual. These consisted of dark spots in the fundus near the periphery in which one or two retinal vessels were prominent. Subsequently these prominent vessels were surrounded by a translucent area in the pigment layer of the choroid and subsequently a circumscribed area of sclerotic vessels resulted, such as are often found as a consequence of syphilis or arteriosclerosis. In one of these eyes the author found at autopsy extensive retinal hemorrhages and numerous thrombi. The author believes that the more sudden and intensive the visual disturbances, the more favorable the prognosis as to later recovery.

The Treatment of Albuminuria in Pregnancy.—E. J. Ill (*Jour. A. M. A.*, July 11, 1914) believes that this condition in primiparæ must be distinguished from the same when it occurs in multiparæ as regards methods of treatment. In discussing albuminuria in

primiparæ, three cardinal conditions must be considered: (1) The character of albuminuria, (2) the presence of uremic symptoms, and (3) the time to which pregnancy has advanced. A primipara with slight or moderate albuminuria with few kidney elements and no uremic symptoms at a time before the viability of the child, should be closely observed and given a salt-free restricted diet with an occasionally calomel purge. In a similar case with much albumen and many kidney elements, reduced quantity of urea and urine but still no uremic symptoms, must be regarded more seriously and treated similarly with the addition of rest in bed and constant observation. In cases where the child is viable and the albuminuria is increasing together with the presence of uremic symptoms as shown by partial blindness, headache, convulsions and even coma, Ill thinks that the uterus should be emptied if the purgation, lavage of stomach and rectum, morphine and absolute milk diet have had no effect in alleviating the symptoms. Venesection is of value in such cases. If the albuminuria and uremic symptoms have come on suddenly, early delivery by induced labor is required provided there is sufficient time. When convulsions have occurred or there is great edema of the retina and also headache, the classical Cesarean section is advised by Ill in preference to the vaginal operation. In cases not seen until the convulsive stage without symptoms of labor, Ill advises purgation and enemas if there are lucid intermissions. When the coma is deep and lasting in spite of blood-letting, he advises Cesarean section by the abdominal route. If a patient has convulsions or is in coma with the cervix dilated and labor pains present, the administration of chloral, morphine, venesection or veratrum viride followed by the forceps are favorable for both mother and child. Where the cervix is not dilated abdominal Cesarean section is indicated. Ill finds that multiparæ rarely present the same serious disturbances as primiparæ, although 8 per cent. of his fulminating cases were multiparæ, all of which together with the children were saved. The author advocates the radical treatment of the eclamptic cases and states that with the classical Cesarean section the mortality was 10 per cent. of mothers in forty cases, while 45 per cent. of the children were lost at birth or soon afterward.

ITEM.

TO AMERICAN OBSTETRICIANS.

At the International Congress of Obstetrics and Gynecology, meeting for the first time in America at New York, September, 1915, the topic of "Puerperal Septic Infection" will be one of the principal subjects for discussion. To the undersigned has been assigned the review of this subject, and I desire to obtain the results of the observations and experiences of American colleagues upon the following:

First.—The treatment, prophylactic or curative, of puerperal septic infection by vaccines.

Second.—The occurrence of puerperal septic infection by bacteria other than the streptococci and staphylococci, such, for example, as the bacilli coli communis.

Third.—The occurrence of puerperal septic infection from pre-existing foci, as salpingitis, appendicitis, or other collections of pus.

Fourth.—The occurrence of puerperal septic infection from communication by water or possibly atmosphere of contaminated wards.

Such material will be fully credited to its sender.

It is desirable that the American profession be fully represented in the discussion of this important subject.

Reports of cases, reprints, and other material will be gratefully received by Dr. Edward P. Davis, 250 South twenty-first Street, Philadelphia, Pa.

DEPARTMENT OF PEDIATRICS.

PROCEEDINGS OF THE AMERICAN MEDICAL ASSOCIATION.

SECTION ON DISEASES OF CHILDREN.

Annual Session, Tuesday, June 23, 1914.

Chairman's Address, "THE WET NURSE IN HOSPITAL PRACTICE."

DR. F. S. CHURCHILL, Chicago.—The high death rate during the first year of human life which prevails everywhere attracts universal attention. Its immediate causes are poverty and ignorance. In cities a relatively large proportion of this mortality occurs in institutions, that is, about 30 to 40 per cent. of the death rate is institutional. The babies are often brought in in a poor condition. Their resistance is low—in winter from disease of the respiratory tract; in summer from gastrointestinal disease. In a great many of these babies the modern methods of substitute feeding are not satisfactory, and there is an increasing tendency to revert to human milk, the superiority of which is universally acknowledged for normal children, and with sick babies also it is found to be the best food. In the Children's Memorial Hospital during the years 1909-10 human milk was frequently used and during the last three years regularly used. From the Salvation Army Headquarters wet nurses were obtained and kept on hand. The examination of these women included the Wassermann test. The mother was allowed to nurse her own baby on one breast and the hospital baby on the other. The breast was stimulated thus every two hours. Babies frequently received mixed feeding, alternately breast milk and bottle milk, and as the child improved it was given less breast milk. The amounts furnished by each nurse varied; starting with 8 or 10 ounces per day under hygiene and proper diet this might be increased to 50 ounces per day, and by this method many babies could receive breast milk daily, some of the infants only taking very small amounts at a feeding, of 2 or 3 ounces; thus an average of 58 ounces could give many feedings a day. The question should be asked what are the results of these feedings; do the babies on breast milk do better than other infants? I have studied the records of a large number of babies; these are divided into two parts: 1. babies on mixed feeding, 2. babies on cow's milk alone. In

the first class were 715 babies and in the second 550, on cow's milk. The children ranged in age from one week to one year and included the type of cases usually admitted to a hospital. Observations showed that the mortality in the first group was 36.3 per cent.; in the second 36.9 per cent.; in other words, the mortality in the two groups was practically the same. These records then indicate that the second group, who did not have the advantage of breast milk, must possess some advantage, either in superiority of management or of better physique. The general management, however, was the same in both cases so that the advantage must lie in physical condition. The best index of physical condition in infants is their weight so that it was necessary to determine the height and weight of both classes. It was then found that Group I averaged 3.5 months and 7.6 pounds in weight; while Group II averaged five months and 9.3 pounds weight; the second group being thus older and heavier than the first and possessing this advantage. Group II was then subdivided and group II(a) averaging 7.7 pounds in weight was compared with Group I still received some breast milk and Group II(a) received cow's milk. When thus compared the death rate in Group I was found to be 36 per cent. and in Group II(a), 44 per cent. In other words, a larger proportion of those receiving breast milk survived. These figures are in favor of breast milk but the percentage is small, only 8 per cent. It must be remembered, however, that the supply of breast milk is limited and that many of the children come in in a practically moribund condition; to some of these we have fed breast milk and to some modified cow's milk. It is not improbable that in some of these desperate cases breast milk is not the proper food; it might be that some combination of water, fat, proteid and sugar would be better; at present we do not know. A second fact of importance is that the breast milk be properly distributed. With the healthy child it is better to give breast milk once or twice daily, but we do not know that this is the case with the sick. It is therefore very necessary that the available supply of breast milk be distributed with judgment. Then the children were divided into Classes A, B, and C: A, those receiving exclusively breast milk; B, those receiving half breast milk; C, those receiving less than half breast milk. The results were as follows: Mortality in A, 59 per cent., mortality in B, 3 per cent.; mortality in C, 50 per cent. Class A included desperate cases, those whom it was thought had a bare chance of life by using breast milk; these cases were not successful; Class B were not such desperate cases and in these a change for the better took place with the use of breast milk, the low mortality evidently being due to breast milk; Class C were not serious cases and the mortality was nearly as high as in A. The lesson of these three classes is obvious. What then has been the effect on the hospital infant death rate as a whole? Has the number of recoveries been sufficiently large to influence the general mortality? It is not found that the average general death rate has been lowered since the systematic use of breast milk feeding. It has been evident,

however, that prolonged stay in hospital for infants is undesirable. Breast-fed babies, kept in hospital, contract communicable diseases and complications are common among them. If it is not possible to procure breast milk for them at home they should be discharged from the hospital and put under the care of the social service department.

SOME PRACTICAL BREAST-MILK PROBLEMS

DR. A. W. MYERS, Milwaukee, Wis.—In the crusade against high infant mortality maternal nursing is the most desirable method of feeding and far superior to substitute feeding. While this, however, is possible in a larger percentage of cases there are some instances in which both mother and child require help. A great deal has been accomplished by regular habits of rest, fresh air and exercise for the mother and in reference to the psychic state which is particularly important in its relation to glandular activity. It is unjust, however, always to blame mothers for not nursing their babies; the child does not always thrive, it sometimes loses weight and seems uncomfortable. Cases of this kind are a frequent story. The mother complains that she tried for two or three months to nurse the baby, and it did not gain. Many mothers do not know what to do for the best. There are many factors in this problem, the diet of the nursing mother being of most importance, and there are many features which receive scant attention. Minor changes cannot be demonstrated chemically and they do not follow at once upon changes in diet. In Denmark, the foremost dairy country in the world, strict regulations are passed upon the feeding to cattle of substance which affect the flavor and composition of the milk. The tolerance of the digestive tract of the infant as a rule takes care of minor changes in the mother's diet, but with some children there is discomfort, restlessness at night, abdominal distress between nursings, although in spite of this stools may be satisfactory and the child may gain in weight. In the earlier weeks of lactation restlessness in the baby is the result of the mother's milk. The mother herself is kept awake at night and becomes worn out. In three cases seen of this type where the mothers had been in the habit of eating oranges, apples, green vegetables, etc., the children showed restlessness and abdominal distress after feedings. These were typical cases and with a regulation of the mother's diet the distress was removed and the children recovered. Perhaps in the use of fruits, vegetables, jellies, jams, etc., in the mother's diet, aromatic substances pass into the milk. Different babies show varying degrees of sensitiveness to these substances. Many babies do well no matter what the mothers eat. An extremely bland diet, with plenty of starchy substances is essential for the nursing mother. This can be gradually added to until it is shown what is the disturbing factor for the infant. As early as the fourth century foods that were either salt, acid, bitter, sweet, or strongly fragrant were forbidden to the nursing mother. To-day it is said that such restrictions are

not necessary. It seems to me that we have removed too many restrictions and that we may learn something from the lessons of the day of Aristotle.

THE FEEDING OF SKIMMED BREAST MILK.

DR. F. C. NEFF, Kansas City, Mo.—The problem of the high fat content of milk is ever with us. Nervous disturbances of the mother result in digestive disturbances in the infant. In many cases the reduction of fat may be only a temporary necessity. Regulation of nursing and dilution of the mother's milk may be tried, but simple dilution reduces all percentages alike, while in skimmed milk the normal amounts of sugar and protein are retained and that of fat reduced. Fat reduction hastens the emptying of the stomach, while the duodenal reflex is stimulated when fat is present in the duodenum. Persistent vomiting and infantile eczema often result from over-feeding of children, and too high fat content always results in digestive disturbance, while the reduction of this fat causes restoration of the child. In time the child may recover an increased tolerance for whole milk and more fat can be added to the diet. In three typical cases of indigestion, vomiting and pylorospasm, respectively, skimming of the milk has resulted in complete recovery of the child with gain in weight. The method of withdrawing the fat from human milk is to take a twenty-four hours' supply of milk and let it keep on ice, the supply of the previous twenty-four hours' being used for feeding. A rubber-stoppered bottle can be used with a small tube at the bottom from which milk can be withdrawn without touching the cream. In this way the amount of fat reduced can be easily determined. Breast milk stays sweet on ice much longer than cow's milk and when skimmed makes a safe and digestible food.

DISCUSSION.

DR. ZAHORSKY, St. Louis.—These are the most valuable papers that have appeared in the section for several years. Most practitioners have a great difficulty in keeping the baby on the breast. It is important to know how to treat severe dyspepsia in the first weeks of life. I was surprised to hear Dr. Myers say fruits were bad. I have been told that citric acid could not get into mothers' milk and modern writers do not exclude fruit from the diet. These cases are apparently substantiated by sound clinical observations. Dr. Neff's method of skimming milk seems rational, but there are other means of treating these cases; the baby can be put on rice water. What we want to know is why does the baby originally get the severe acid dyspepsia? We know very little about breast-fed babies compared with artificially fed babies. We know, however, that if the mother is kept up constantly at night she will not keep the baby on the breast.

DR. DOUGLAS, Detroit.—For a good many years I have opposed feeding of fruits to nursing mothers and for as many years general

practitioners have opposed my views. The profession has learned to give everything to nursing mothers. Not only highly flavored, but sugary foods should be excluded. Mothers and nurses also are accustomed to give sugary decoctions to the child with medicines because the child likes it. This ruins the child's digestion.

DR. LOWENBERG, Philadelphia.—Last year I made a plea for the study of breast-milk problems. I feel these papers show a step in the right direction. Physicians are too quick to discontinue breast feeding when the child shows signs of dyspepsia because they are at a loss to know how to handle the vomiting. It is important to study the mother's diet. Dr. Neff's suggestion as to the skimming of milk is important and should be placed into the hands of the general practitioner. Many more children could be kept on the breast than at present and these facts should be given wide publicity.

DR. MORSE, Boston.—Human milk is considered the best food for the baby, but is it the best food under all conditions? Human milk contains fat, water, sugar and protein, and where there is sugar intolerance or fat intolerance it will disagree almost as badly as cows' milk. I do not think there is any question that highly flavored foods are bad in the mother's diet, although the majority of healthy women can eat anything without disturbance of the baby. Often when babies have colic that is due to the nervous make-up of the mother. I do not believe we have any data to prove that increase in sugar in the diet has any effect in increase of sugar in the milk.

DR. MYERS, Milwaukee.—Substances that give rise to flavor are purely aromatic acids. Phenol derivatives are responsible for the flavors in highly flavored foods. In metabolism these functional proteids are apt to be combined with the glucose in the blood and eliminated in the urine in the form of phenol and glycuronic acid. These substances might also be combined with glucose in the breast and eliminated in the milk. There are unknown substances, amounting to 1 per cent. in human milk. This is a large gap in our knowledge of the constituents. These cases of disturbance are, as Dr. Morse said, exceptional, rather than the rule. Effects of anxiety and fatigue are very great. The effect of sugar is an indirect one through the disturbance of the mother's digestion.

CARE OF DELICATE AND PREMATURE CHILDREN IN THE HOME.

DR. H. M. McCLANAHAN, Omaha.—In many cases there is not sufficient care in saving the lives of premature infants. In this respect there are two general requirements: first the regulation of the body heat, as given off by the excretions, the lungs and the skin. The body loses 70 per cent. of its heat by conduction from the skin. This heat can be saved. The maintenance of nourishment is the second important consideration. In the conservation of heat the incubator has been found unsatisfactory. For several years I have adopted the following method: a large clothes basket is procured; a pad is placed at the bottom, then a layer of white oilcloth, then cotton batting; this is covered with a layer of white flannel, the flannel

portion is folded and the upper fold can be turned back leaving air space for the face. For hot water bottles I use magnesia bottles with spring tops and rubber stoppers. Five bottles have been found sufficient to maintain a proper temperature of 90-95°. When the room temperature is lowered it may be necessary to cover the basket with a rubber sheet; the body is thus kept warm and the face exposed. The body must be annointed with oil and wrapped in cotton and absorbent cotton pads must be used in place of napkins. When there is a gain in body weight the hot water bottles can be discarded. In regard to nourishment, many young infants are not strong enough to draw milk from the breast. Sometimes physicians think that the infant takes nourishment when it has none; in these cases milk should be pumped from the breast, diluted and fed to the infant. Whatever dilution it takes should be rapidly increased. A Breck feeder may be used as this is superior to an ordinary medicine dropper and for the first two or three days it may be necessary to feed the infant every hour. If the infant survives it may become as strong as a normal infant and have a healthy childhood. Dangers to be guarded against are the regurgitation of food and too high a temperature. Excessive heat will produce fever and a thermometer should be kept in the basket. A very frequent mistake is to suppose that the infant has taken the breast when it is unable to do so.

DR. H. D. CHAPIN, New York.—I emphasize Dr. McLanahan's remarks about incubators. The incubator supplies heat but loses the vital factor, fresh air. Incubators should be abandoned entirely. Another factor in dealing with premature infants is the danger of food getting into the larynx, even with a Breck feeder this is possible and gavage must be resorted to instead.

DR. ZAHORSKY, St. Louis.—In addition to the basket many methods can be successfully used. I have used a soap box which has been placed near a hot water radiator, the side of the box near the radiator being taken out, so that the heat passes into the box. Too great heat may be a serious cause of injury to the baby, leading to cyanosis and death. The heat should not be over 90°. If the baby gets too cold do not wait for hot water bottles but warm it up with a warm bath. Most premature babies die because insufficiently fed; they die of exhaustion. The feeding is very important. One-thirtieth of the baby's weight in food should be given the first day and this increased till it is receiving one-fifth of its weight in food. Use a catheter for feeding and if only small quantities can be taken, give a feeding every hour if necessary; the main thing is that food must be taken.

DR. HAMILL, Philadelphia.—I want to join the general protest against the use of incubators. It is impossible to give the baby enough fresh air with an incubator. I had an experience last winter in a children's ward. I was forced to take a premature infant into the ward and did not feel justified in robbing the other children in the ward of their customary amount of fresh air at night. I decided therefore to take the baby into the ward and put it close to a radiator, maintaining a heat about the body of 90°. The temperature in the

ward fell to 55° during the night. That baby did better than any other premature infant I have ever had. I would not generally advocate this extreme method, but it is a fair demonstration that such babies can stand cold air without detriment.

DR. TALBOT, Boston.—The new-born baby maintains its body heat by use of glycogen deposited in the liver. When the mother's milk does not come the baby must use its body fat. If the milk does not come for five or six days the child will lose weight because of this use of body fat. If, therefore, the baby is not well developed, it must have milk early to get enough energy to keep alive and to maintain the body heat. This discussion is in accord with what we have observed with scientific measurements of heat.

REFRACTORY OR SO-CALLED "FAST" CASES OF MENINGOCOCCUS MENINGITIS.

DR. HENRY HEIMAN, New York.—I will preface my remarks by saying that we have called these cases meningococcus meningitis instead of using the old term "epidemic cerebrospinal meningitis," which may be also due to pneumococcus or streptococcus. This includes not only the epidemic forms, but also the suppurative cases. It is well known that since the introduction of antimeningitis serum by Flexner in 1906, the mortality has decreased from 75 per cent. or 80 per cent. to 25 per cent. or less. In a small percentage of cases, however, treatment has not reached perfection; that is, they do not respond to the serum. Let us inquire into the cause of failure of this method. In the first place, in fulminating cases the endotoxins of the meningococcus may be so virulent as to make the action of the serum impossible. The action of the serum depends upon the action of bacteriolytic substances or of antitoxins and when these are not present in sufficient quantity they are not strong enough to counteract the organism and the cases end in death. It is questionable whether a sufficiently strong serum can be obtained to counteract this type of organism. Another cause of failure is incomplete, insufficient, or unskilful use of the serum. The mortality statistics are least when based upon the reports of the most competent workers. There may also be an early onset of hydrocephalus or complications of tuberculosis or pneumonia may cause death in spite of the serum. The refractory cases belong to a distinct type of the disease. In these cases the meningococcus is found in the spinal fluid. The disease is not influenced by the introduction of the serum. It runs a prolonged course with a high septic temperature with occasional remissions and finally death ensues or a greatly protracted recovery. These cases are supposed to be due to strains of meningococci "fast" to the serum employed. Only recently has there been made any fundamental pathological distinction between the strains. One strain may be easily digested by the infraleukocytic enzyme, but certain cases do not respond to the ordinary antimeningitis serum. They may be due to the parameningococcus and the serum should be prepared from cultures of the particular organism.

DR. LOWENBERG, Philadelphia.—I feel very grateful for this paper. The causes of failure are well marked. I fear I may be classified among the unskilled users of serum. I have seen a great many cases in congested districts of Philadelphia but have never had any get well from the use of serum. We used Flexner's serum all the time and injected it early and I for one wondered where all the statistics came from. Perhaps all the cases that I saw were "refractory." I hope that the discussion will clear up some points. The serum we used did not come from the Rockefeller Institute, but from a manufacturing chemist.

DR. H. D. CHAPIN, New York.—I hope that Dr. Heiman will tell us something of his technic. He speaks of frequent unskilful use of serum. Many authorities tell us that the serum should be allowed to run from the tube. I have never been able to get the serum into the spinal canal this way. It has been injected. The use of a funnel has never been successful.

DR. R. H. DENNETT, New York.—I have had a great deal of difficulty in using the gravity method and it was not persisted in. We have never had bad results from the use of a syringe.

DR. J. ZAHORSKY, St. Louis.—In my experience I have found it a mistake to give too large a dose. You get a very severe protein intoxication which diminishes the resistance of the child. The same thing may be said of diphtheria antitoxin. The child has to fight too much foreign protein. Two or three injections should be given and then the body allowed to rest. I have had good results with cases of infants in which after one or two injections you could not get any more spinal fluid.

DR. MORSE, Boston.—The meningococcus is not a single organism but a class. I have a doubt about the Doctor's organism being specific. When Flexner's serum first came out we had remarkable success with our results. About three years ago we began to have less good results. The cases did not respond, although the serum used was the same. We then tried some new serum, prepared by the State Board of Health of Massachusetts. This did better. However, now we get some cases which respond to the Board of Health serum and some which respond to Flexner's serum, and some which do not respond to either, and in which the organisms are more numerous after the serum than before. The type of organism therefore seems to have changed in Boston in the last few years. The serum prepared by the Boston Health Board must have been founded on more recent strains than that of Flexner. The strains are endogenous to Boston and not to New York.

DR. HIRSCH, Baltimore.—What is the experience of cases which after several punctures give a dry tap? What is the use of meningococcus serum in these cases?

DR. HEIMAN, New York.—In reply to Dr. Lowenberg I would say that in sixteen consecutive cases, in which the meningococcus was found in the spinal fluid, every one recovered with the use of Flexner's serum. In reply to Dr. Chapin, the technic is as follows: First make a lumbar puncture and withdraw 25 c.c. of serum, then inject by

the gravity method. The fluid is raised 12 inches above the patient's spine and the funnel slightly inverted; the serum is poured in warmed to blood heat. A little freshly distilled water is poured in the funnel so that every drop of serum is secured; then the needle is withdrawn. A danger that may occur is apnea. It is probably due to slight pressure on the respiratory center in the medulla. We perform artificial respiration and an assistant always watches the patient for a short time.

DR. ZAHORSKY, St. Louis.—Why do you inject so frequently?

DR. HEIMAN.—It takes about twenty-four hours for the serum to pass through the circulation, then there is no further effect. You must give at least three or four consecutive injections of serum to get good results. Anaphylactic shock may be greater after two weeks than after three or four days. I agree with Dr. Zahorsky that too large doses should not be used. In young children under one year, serum is of little use. The nervous system is extremely unstable. The meningococcus produces extremely rapid inflammatory changes in these cases. In cases of a dry tap I have injected a few cubic centimeters of serum and a few days later have obtained serum. I agree with Dr. Morse that we have very many strains and if we get a refractory type we must have a special serum prepared to respond to that type.

URINARY ANALYSIS IN THE DIAGNOSIS AND TREATMENT OF DISEASES OF INFANCY AND CHILDHOOD.

DR. ROWLAND GODFREY FREEMAN, New York.—Great importance should be attached to a fairly complete and thorough examination of urine as an aid to furnishing important information about the patient. The ordinary office examination or those of commercial laboratories do not always supply the most essential facts. The procuring of specimens is not always easy, especially in female children. Infants pass very little urine and very often. From accurate observations made it has been found that an infant urinates about every thirty minutes and that they void urine at regular intervals during sleep. For a male infant a bottle is the best method of saving all the urine and for the female a simple cup will be found useful; pressure over the bladder will result in passing of urine. In pyelitis it is important to secure several specimens. The dilution, acidity and evidences of acidosis and intestinal intoxication should be considered. A complete urinary analysis should give the specific gravity, qualitative reaction by litmus paper, examination for albumin, glucose, indican, phenol, acetone and diacetic acid. Tests for bile and microscopical examination of sediment may also be necessary. Specific gravity is usually low on a fluid diet but sometimes a high specific gravity is found at three or four years. Traces of albumin are frequently found but may later disappear unless associated with nephritis. An acetone breath may often be detected in children when acetone is present in urine. This is frequent in babies taking more breast milk than they can digest and disappears

if the feeding is cut down. In cases of persistent vomiting and cyclic vomiting an acetone breath is often found. This is best treated by alkalies. With intestinal intoxication acidity with acidosis is frequently found. Often with marasmic babies a sudden gain is shown with edema of the hands and face and associated with intestinal intoxication. Pyelitis cases are frequently allowed to run on without treatment. One or two leukocytes in the urine do not indicate pyelitis, but a few in the male and more in the female baby are suspicious of this condition. Pyelitis in infants is an acute infection and should be promptly dealt with or the case may run to a fatal termination. It is apt to occur at the end of the first year and more often in the female. This is very likely from external contamination. This may be avoided by training the child to have a morning movement of the bowel. If a number of leukocytes are present in the urine an examination should be made for bacteria and if these are present they should be grown on culture media to determine the type of infection.

DR. SEDGWICK, Minneapolis.—I have shown previously that recurrent vomiting is associated with greatly increased kreatin and kreatinin excretion accompanied by casts. Acidosis is produced by withdrawal of carbohydrates and we should take care not to mistake acidosis for the fundamental part of the recurrent vomiting. Many mistake the effect for the cause although the acidosis is the secondary condition. The point that infections, occurring as they do more commonly in female children, must come through the urethra, is not proven. Dr. Huntington and myself worked on some experiments to see if this were so and I do not think that it is the case.

DR. LENNY, New Haven.—It is important to collect several specimens for examination.

DR. HELMHOLZ, Chicago.—I would emphasize the point made by the last speaker. Several specimens should be taken on several successive days. In chronic cases of pyelitis there may be no pus for several days and this may be followed by a sudden gush of pus. As regards albuminuria in older children, an orthostatic form should be recognized. This condition can be cured. Whether it is harmful to the child to excrete albumin has not been determined.

DR. FREEMAN.—It is as important to recognize acidosis from underfeeding as from overfeeding. In underfed children acetone would be present in the urine.

DR. BUTTERWORTH, New Orleans.—Pyelitis is frequent in males as well as in females. Dr. John Thompsom of Edinburgh found 27 per cent. of pyelitis cases in boys. I believe we often overestimate acetone and diacetic in the urine. In almost any febrile disturbance these will be found.

DR. HENRY HEIMAN, New York.—In orthostatic albuminuria it is necessary to obtain the first specimen on getting out of bed. This will be negative. Upon raising the body to an angle of 45° albuminuria will appear. This is due to venous pressure. It is well to take a specimen morning and evening. If albumin is present in the first specimen, that is toxic albuminuria. I have used the ordinary cathe-

ter to obtain specimens in the female. With regard to pyelitis we have the ascending type, the descending type and the transparietal type. I must say that I consider it more frequent in females. The majority of pyelitis cases are found to be *B. coli* infections; a few with pyocyanus infection; most infections are through the rectum. If these cases do not get well with or without urotropin they become chronic. The Germans believe that where we have occasional pus-free urine that this is due to miliary abscesses in the cortex of the kidney.

DR. MEADE, Middleton, Ct.—Is it possible by the regulation of the urine to control eczema and urticaria?

DR. FREEMAN.—There is considerable variation in the amount of pus in the urine, but if you can get one specimen with sediment without pus and no bacteria your case has recovered. As to controlling eczema by modifying the urine, I think that is more a matter of diet, but no doubt controlling the urine would help.

AMEBIC DYSENTERY IN CHILDREN.

DR. L. R. DEBUYS, New Orleans.—Amebic dysentery is not considered common among children because they are less exposed to etiological factors than are adults. It is, however, commoner than is generally believed. In the Children's Hospital in New Orleans there were four cases in every 3000. On account of greater exposure it is more prevalent in the male than in the female. It is caused by water or by green vegetables. The symptoms are abdominal pains, tenesmus, dry skin, prostration, anorexia, vomiting, pus and blood in the stools and fever. The blood picture is one of secondary anemia. The diagnosis is not difficult to make. A microscopical examination is made of the warm, liquid stool. It may be distinguished from bacillary dysentery in which the child is more toxic and less fallow than in the latter. Final conclusions cannot be drawn from the study of a few cases, but a further study of cases should be made. The treatment of seven cases here recorded, was ipecac in the form of pills and emetin, which was given with satisfactory results. Rest is absolutely essential to the bowel and to the individual. In all the cases treated ameba were found in the stools for varying lengths of time. Emetin was given in continuous doses, sometimes of 1 grain without harmful effects. It seems that it is a specific in these cases, resulting in disappearance of blood from the stools very promptly and tending to give the bowel the rest necessary for recovery.

DR. SOUTHWORTH, New York.—We are bound to look upon this disease as a matter of warm climates. So few cases come under our notice, but I believe that cases are not sufficiently investigated for ameba. I remember a case last summer in Maine of an old woman of eighty years, with amebic dysentery, which was checked with the use of emetin. We derive so many of our garden products from the Southern states that infection may be acquired that way. We should therefore be more on the lookout for these cases in children. The

use of emetin seems to be perfectly safe and satisfactory with children as with adults.

DR. H. D. CHAPIN, New York.—This disease occurs rarely in the North but every year there are one or two cases. The cases are probably more common than we think and there is not sufficient search made for ameba.

DR. AMESSE, Denver.—Any contribution to our knowledge of this disease should be welcome. In warmer countries amebic dysentery and malaria remain scourges. In the Philippines amebic dysentery is a *betè noir*, but is rarely found among Philippine children or American children. They seem to have a natural age immunity. There are a number of cases of bacillary dysentery. The immunity of Chinamen to typhoid is well-known and of the Negro to yellow fever and hookworm disease. Children also have an age immunity to yellow fever. In emetin I believe we have a drug to conquer the last stronghold of tropical diseases.

DR. BUTTERWORTH, New Orleans.—It is important to distinguish amebic dysentery from bacillary dysentery, which is a short, sharp attack. I remember a case of a Philippine soldier in New Orleans. He had had amebic dysentery. He returned to the city and married. His wife had four children and in time the youngest child had amebic dysentery. Two of the other children and the wife also suffered from it. This was direct evidence that the four other members of the family had contracted amebic dysentery from the same source.

THE USE OF A SERIES OF VACCINES IN THE PROPHYLAXIS AND TREATMENT OF AN EPIDEMIC OF PERTUSSIS.

DR. ALFRED F. HESS, New York.—Last December whooping cough made its appearance in a large infant asylum of about 375 infants under five years of age. It soon assumed epidemic proportions. This was an excellent opportunity to try the effect, prophylactic or curative, of pertussis vaccine. In 1906 Bordet and Gengou described the bacillus of whooping cough. This was not universally accepted. A vaccine has been made from this, but there is considerable difference of opinion on the subject. In our experiments we made use of different kinds of vaccine; I, a polyvalent vaccine composed of Bordet-Gengou bacillus and two atypical strains; II, Parks, Davis and Co.'s Bordet-Gengou bacillus; III, Bordet-Gengou bacillus isolated in the Board of Health laboratory; IV, three strains of Bordet-Gengou bacillus isolated from cases in our epidemic; V, pure autogenous vaccines. The study of cases in an institution presented better opportunities for observations. These cases were all infected from the same source, probably with one strain; the children were living under the same conditions and came from the same stratum of society; they were getting the same food and fresh air. This corresponded as closely as possible to laboratory experiments in which animals are kept under the most similar conditions. In a hospital cases are drawn from various circumstances and infected with various strains. There is no

means of determining the actual onset of the disease, other than the word of the mother. As regards our results of 244 cases inoculated with vaccine twenty-one developed whooping cough. There was found to be considerable difference in the effect of various vaccines. The third type seemed to have specially good results in that only six of 141 developed whooping cough. There were 130 cases not inoculated. Of seventy-five control cases not vaccinated, fifty-nine came down with the disease. Twenty-one of 144 vaccinated cases came down. This would show some preventive action of the vaccine. The whooping cough was of a very mild kind. There were no deaths and very little pneumonia. The most severe cases occurred among the vaccinated and it was found that where prophylactic vaccination failed the vaccine had no effect curatively. Those who had the disease had it severely. The most severe cases recorded had received a large dose, 2000 million by mistake. The conclusions to be drawn from this are that prophylactic pertussis vaccination is of value, especially in institutions. It is not of value in a curative sense, but there is no vaccine, so far as I know, that is of use curatively.

DR. ZAHORSKY, St. Louis.—I have had forty cases treated by pertussis vaccine, in private practice. Infants in asylums have a lessened immunizing power. They do not resist bacterial infection so well as other children and better results can be obtained in private practice. I am glad to hear that prophylactic injections are of use. A certain group of children, healthy but of nervous temperament, can be immunized to their own infection. I believe vaccine is curative and that one or two injections at the height of the disease makes it take a milder course, although not shorter. I think it should be added to our therapeutic aids.

DR. McCLEAVE, Berkeley, Cal.—I agree with Dr. Hess that vaccines have no particular curative power. I have used the pertussis vaccine in a limited number of cases and one or two mothers thought the children were benefited, but I could not corroborate the statement. In a recent epidemic I have had all the children vaccinated, sick ones and well ones. I believe the method is of use for prophylaxis and should be used. In my private practice I hope to prevent some children ever having whooping cough. I hope to determine the duration of immunity conferred by vaccines. Next year I may have information on that point.

DR. HAMILL, Philadelphia.—I think that physicians should use care in approaching the subject of vaccine therapy. Vaccine treatment is expensive and vaccines are sometimes detrimental in their results. I have known a number of cases in which very alarming symptoms followed the use of vaccines. The results of the treatment are difficult of interpretation and there is as much evidence against it as for it.

DR. RICHARDSON.—I should like to have one point made plain. Were the children put to bed and were the nonimmunized class older children? If whooping cough can be controlled it is of great value to have an immunizing agent.

DR. MEADE, Middleton, Ct.—We have had remarkable success with vaccines made by Dr. Fisher. Most of the cases were complicated with pneumonia. I hear the New York laboratories have a difficulty in separating pertussis from pneumonia. We gave vaccines of pneumococcus and pertussis and the results were remarkable.

DR. REIMER, New York.—At what stage of the disease was the vaccine given? In our experience the earlier the inoculation the better the result obtained.

DR. HEIMAN, New York.—It is extremely difficult to distinguish chronic bronchitis due to *B. influenzae*. These children often have a pseudopertussis cough.

DR. LOWENBERG, Philadelphia.—I do not think Dr. Hess has proven his case. It is remarkable that vaccines so good in a prophylactic sense should not be good for curative purposes. Will Dr. Hess be specific in telling us what was the amount of contact in cases that did not develop the disease. There is no proof that the vaccine was effectual.

DR. A. F. HESS, New York.—Dr. Zahorsky spoke of the low immunizing power of institutional infants. That has not been proved. One hundred cases in an almshouse will immunize as well as those in private practice. The infants are more susceptible to infection. I excluded from my results all cases confined to bed. All the children were runabout children and therefore exposure to infection was equal. Vaccines were given in the earlier stage; as soon as the child whooped it was vaccinated. Dr. Heiman raised the question of *B. influenzae*. This was found in a large number of the cases with the Bordet-Gengou bacillus. The prophylactic results were proven in one case in ten. This is not as good as typhoid vaccine, but in comparison with those nonvaccinated it is good. It was easier to prevent the disease before infection than to cure it.

THE EXAMINATION OF THE CHEST IN CHILDREN.

DR. RICHARD M. SMITH, Boston, and DR. CLIFFORD D. SWEET, Fresno, Cal. (read by Dr. Smith).—The importance of this examination has been forced on our attention, because it has been necessary to determine in a large number of patients whether tuberculosis was present or not. In addition to the von Pirquet reaction, data have been secured in regard to weight and morning and evening temperature, and the course of the cases has been followed for many months. The primary interest centers in the determination of the presence or absence of tubercle bacilli, but the matter should not be left there. It is also essential to distinguish between quiescent tuberculous infection and the presence of active disease. Our cases ranged from one and one-half to thirteen years, but the majority were from five to ten years. The temperature records were made at the clinic or at home. In fourteen cases with temperature above 99° F. there were three cases of active tuberculosis. In 100 cases 9 per cent. were active cases. A slight rise of temperature with lung symptoms may be due to other causes and tuberculosis may be present with low temperature. Of

sixty-five children weighed, two with tuberculosis were above average weight. This is largely dependent upon food. Of ten children with night sweats none had active disease. This sign is nonessential in children. A sense of general malaise is frequent, but its absence does not exclude tuberculosis. Four cases who appeared perfectly well had tuberculosis. Of thirty-four cases with known exposure to tuberculosis six had a negative von Pirquet and in two cases a + von Pirquet was the only sign. Of thirty-four cases eighteen showed signs in the lungs; of these the *x*-ray showed pulmonary lesions in thirty. It was found that only a small proportion of those exposed to infection escaped, but a considerable number survived the active stage. The sputum was often hard to get; in two cases out of four it showed tubercle bacilli. In cases with apex involvement, signs of dulness and change in breathing, fremitus and râles, the *x*-ray showed remarkable agreement with the physical examination. In fifty-two instances where the *x*-ray showed lesions in the lungs this was also shown by auscultation; in seven cases a slight haziness appeared in the *x*-ray among twenty-one cases giving no sign on physical examination. The *x*-ray is a very great clinical aid, but it cannot be made to take the place of a careful physical examination. In cases of enlarged bronchial glands seventy of 100 cases showed a positive D'Espine sign down to the second dorsal vertebra. Of these sixty-five cases had positive *x*-ray findings. It would seem that a positive D'Espine sign is found with enlarged bronchial glands. Of the seventy with + D'Espine sign forty-one had a + von Pirquet. One case of enlarged bronchial glands which came to autopsy had acute endocarditis. Enlarged bronchial glands do not necessarily mean tuberculous glands; they are found in acute pericarditis or endocarditis. It is important in treatment to find the active cases of tuberculosis; patients with old scars should not be treated as active cases. It should be noted also that many suspicious cases have some other organism.

DR. HENRY HEIMAN, New York.—In some of these cases where there is enlargement of the bronchial glands, it may be the results of repeated attacks of bronchitis. I think we should have a bronchioscopic examination.

DR. R. G. FREEMAN, New York.—Dr. Smith emphasizes the importance of physical examination in comparison with the *x*-ray too much. In cases of miliary tuberculosis we may have only an occasional râle. In tuberculous meningitis where there is very little sign in the chest the *x*-ray shows extensive lesions. I think the von Pirquet is of little value in extensive lesions. It is frequently negative in tuberculous meningitis.

DR. HAMIL, Philadelphia.—I think it is very difficult to produce dulness due to presence of enlarged bronchial glands, on account of the amount of tissue. It is possible to develop dulness in the chest of any normal child at will by shifting the child's position or the position of the muscles. I have made this demonstration frequently to my students. This fact must be taken into consideration. I agree with Dr. Freeman that the *x*-ray is a valuable aid in detecting pulmonary

lesions, but unless in the hands of a skilful interpreter it gives as much misinformation as information. In my experience the technicians of the better type are few and far between and good interpreters are fewer.

DR. McLANAHAN, Omaha.—I am astonished that Dr. Freeman should pass any criticism on the examination of the child. I think the x-ray frequently leads one astray. An x-ray man in Omaha made a positive diagnosis of tuberculosis. I said there were no signs. The parents of the child refused to pay the bill which with us is a serious matter. A point to be emphasized is that with all these modern appliances we must not get away from a complete general observation an examination of the child. In regard to bronchial glands you may find these glands enlarged, but this does not necessarily mean tuberculosis. This is one of the best papers I have heard.

DR. H. D. CHAPIN, New York.—I should like to add my testimony to Dr. Hamill's. Some of the x-ray pictures one sees are so confused that nothing can be made of them. There are, however, cases of obscure late pneumonias which give no physical signs and in which the x-ray plate has show them to be superficial rather than central. In these cases the x-ray is of help. We must not, however, be too quick to accept interpretation of the x-ray plates.

DR. ZAHORSKY, St. Louis.—I would like to know upon what signs and symptoms Dr. Smith bases his diagnosis of "active" tuberculosis. With a positive von Pirquet you do not always find tubercle bacilli in the sputum.

DR. SMITH.—In reply to Dr. Heiman, I have not had experience with a bronchoscopic examination. I agree with Dr. Chapin that the x-ray needs the most careful interpretation. Dr. Dodd made all the plates for me and he is most careful in making a diagnosis. He simply states that the plates indicate some pathological lesion. In regard to Dr. Zahorsky's question, one must base a positive diagnosis on the general history of the patient, active loss of weight and obvious illness with a positive von Pirquet, except in miliary tuberculosis and tuberculous meningitis. Cases with a positive von Pirquet are not always active tuberculosis.

Session of Wednesday, June 24.

THE PHYSICIAN'S FUNCTION IN INFANT FEEDING.

DR. H. D. CHAPIN, New York.—Within the last few years a great change has come about in the relation of the physician to his infant patients and also in the problem of infant feeding. In the modern ideas on the care of infants the training of physicians is not sufficient. The family physician who assists at the birth of the child is the one who should be able to direct its nutrition when it is well, as well as when it is sick. He should be able to manage the normal healthy infant. The training, however, of physicians has been in abnormalities. The principles involved in the care of infants must be

in consonance with animal nutrition as taught scientifically and physicians should be better acquainted with this work. It was believed that with a gain in weight the work was accomplished, but experiments in the growth of structures show that a gain in weight may go with poor nutrition and that good physical development may occur with some food that physicians believe unscientific. Many times an unscientific food has been prepared scientifically, and what is really scientific food, prepared unscientifically, has given good results. Great exactness must be used in the investigation of scientific truth. Large amounts of work have been done only to show what is not the truth. Infant feeding is an applied science and any good results justify the method that produces them. The tendency has hitherto been to concentrate attention on a single point instead of viewing the subject broadly. First the standpoint was bacteriological, then chemical, then caloric feeding. Infant feeding is a broad biological question, and chemistry and physics are merely the means to the end and not the end itself, but the new chemistry must be applied by the biologist and not by the chemist. The cells of the body are selective in action and this explains why one infant takes a food which another rejects. In animal experimentation different foods have been tried on several generations of animals with regard to bodily development. As the result of such work there arises the fact that the chemical and caloric values of foods are not final. There is a difference in development of animals on the same calories. It appears that in colostrum there are immunizing bodies protecting against streptococci and staphylococci, so that the selective power of the organism provides for the need of the offspring and food for the young organism is not only protein, carbohydrate and fat, but a very highly specialized substance. If the mechanism for the feeding of the young is disturbed nutrition fails for the adult has a capacity of synthesis that is lacking in the young organism. By too much manipulation the physician is apt to ignore the biological elements in food and if a few simple biological methods are observed physicians may employ what methods they choose and get good results.

THE USE OF BOILED MILK IN INFANT FEEDING.

DR. R. H. DENNETT, New York.—I have found it necessary on occasions to boil milk for infant feeding and in not a single instance have I found that any gastric disturbance followed upon the use of boiled milk. I do not find that raw milk is more digestible. I use boiled milk for intestinal indigestion and continue the boiled milk for two weeks, and then change to raw food for a few days or a week. The stools will then be normal except for a few curds. These cause no discomfort and may disappear in some cases, but in others infants will get up intestinal indigestion by change from boiled to raw milk. Normal infants usually stand the change well. It is impossible to say whether the change from boiled milk to raw will cause trouble, but it is more likely when the boiling is stopped. In

hospitals following a sweeping order to stop boiling the milk I have noticed that curds appeared coincident with the use of raw milk. When the boiling was resumed the curds disappeared. In cases of emaciated infants we tried raw milk, but in only two cases did the stools clear up without boiling the milk. In my experience the prolonged use of boiled milk does not cause rickets, anemia or malnutrition. With the use of orange juice boiled milk stops scurvy. Boiled milk in some cases causes constipation, but this is more easily overcome than when using raw milk.

EXPERIENCES WITH "WHEY-MODIFIED MILK" IN INFANT FEEDING.

DR. J. S. LEOPOLD, New York.—There is no doubt that human milk is the best kind for infant feeding, but this cannot always be obtained and some form of artificial milk must be employed. Eiweiss milk, Keller's malt soup and buttermilk have all been used successfully, but not for long periods; simple milk mixtures with addition of malt sugar have been used with good result. A new milk preparation for infants is Schloss's whey-modified milk which bears a greater resemblance to human milk than other preparations. Infants do not do so well on cows' milk because the percentage of salts in the two milks is different and this milk is so constructed that the percentage of proteids, fats, sugars and salts is the same as in human milk. With young infants a small amount of flour was added to the milk, until three months of age. This whey-modified milk was given to 200 infants, the youngest being eight days old. None of the infants died of nutritional disturbance. Schloss says that the infants took the food well and at times infants who had dyspepsia from breast feeding were fed with this milk and cured. The children showed good development. This milk also gave very good results with fifty-four institutional infants; these children are hard to bring up usually, and in these cases the children did well and none suffered from intestinal disturbances. Even poorly nourished and atrophic babies gained. Sometimes the milk was given in connection with breast milk and gave good results. Six feedings were given in twenty-four hours and the children took the feedings well. The milk is similar to a milk mixture in appearance and has a pleasant taste. Vomiting was usually controlled by this feeding; stools were alkaline in reaction, sometimes loose in young infants; constipation was rarely observed. This food is not indicated after six months of age, but young infants do well on it. All infants do not thrive on whey-modified milk and if anemia develops breast milk must be substituted, but as a rule the general condition is excellent and the subsequent development all that can be desired.

DR. NEFF, Kansas City.—I was interested in a report by Brennerman of a typical case of scurvy treated by the use of boiled milk and in which no other medication was given. I have seen cases develop during the use of raw milk and I agree with Dr. Bennet that one must doubt that heating of milk has any relation to scurvy.

DR. ROYSTER, Norfolk Va.—Personally I am a percentage feeder. I use skimmed milk, water, carbohydrates and cream. I teach home-modification of milk. I never hesitate to advise boiling of milk and I have never seen bad results from it. I often use orange juice in connection with the boiled milk, but where this is not used there are no bad results. I have seen Dr. Leopold's cases and find that in the majority of cases excellent results are obtained with whey-modified milk, but in some cases where the nutrition is bad to start with the results were poor. In institutions the Schloss milk helps a good deal, but in my experience wherever you get more than four babies to one nurse the babies do not do well and the further you get from that the more cases of institutionalism you get.

DR. LOWENBURG, Philadelphia.—My results have been in accordance with those of Dr. Dennett. For three years I have been using boiled milk and for young infants have used flour. The effect upon the stools has been good. In cases of scurvy I give beef juice and vegetable broth. Schloss's milk seems to me to need careful preparation as does eiweiss milk.

DR. DOUGLAS, Detroit.—I have had no experience with Schloss's milk. In regard to heating of milk, I have been using boiled milk for ten or twelve years. I think that scurvy is easily removed and I do not pay great attention to it. I put the child on orange juice and get rid of it that way. If curds follow the use of raw milk the reduction of the amount of raw milk will cause them to disappear. I think children cannot digest as much raw milk as boiled milk.

DR. G. D. SCOTT, New York.—In regard to the modification of the milk, where you have a combination of fat with small proteid and carbohydrate you find the stomach will tolerate that mixture, but as the child gets stronger you can add more protein and possibly take away some of the fat. I believe that there is a change of the milk in boiling. When you milk cows there is a physiological process which is changed by boiling. A physiological food is something the child can tolerate. We must modify milk for the needs of the child. The Schloss milk seems to be the same as the "wine-whey" of ten or fifteen years ago. Scurvy is always brought to the front. I read an article with 100 different opinions on scurvy. I believe it is due to a poor condition of the milk caused by the long delay in sending the milk from the dairy. I do not believe scurvy can be cured in a few days. Prolonged feeding must be the treatment.

DR. ZAHORSKY, St. Louis.—Dr. Schloss has done excellent work, but I don't believe that this milk has any great superiority over top milk mixtures. In St. Louis we have for years used 40 per cent. top milk with excellent success. Sometimes sugar or flour is added. Malt and dextrine are no better than flour and cane sugar.

DR. GRAVES, New York.—As one of the younger men my experience is confined very much to watching older men in practice. I have seen scurvy develop under the hands of very competent men and there was no doubt as to the real and acute suffering of the infant. Boiled milk has not been found to be the cause, but it may be caused

by Pasteurized milk. Orange juice should always be used I believe where there is Pasteurized milk.

DR. MORSE, Boston.—It is a great pity to lay down any rule in regard to what should be done all the time and what should not be done all the time. There are two reasons for boiling milk: one is to kill bacteria in the milk; the second is to lessen disturbance from casein indigestion. Boiled milk makes casein digestion easier. I would rather feed babies continuously on raw milk. In regard to the question of scurvy, there is only one safe and positive statement to be made as to its etiology and that is that no one knows anything about it. I have seen it occur with breast milk and with raw cows' milk. Schloss's milk does not prove anything more than that babies without any digestive disturbance will thrive on any reasonable mixture. We must individualize with our methods of infant feeding.

DR. DENNET.—I do not agree with Dr. Morse. After an extensive use of boiled milk no one can say that it has no further effect than that of destroying bacteria. I have seen cases of long-continued diarrhea in infants treated with boiled milk and in three days the stools were normal. With simple dilutions you get more protein indigestion than where you use higher fats. With boiled milk babies will stand higher proteid.

DR. LEOPOLD.—The babies fed on the Schloss milk were institution babies. In private practice you can get good results with almost any simple dilution, but institutional babies are different. In these we got as good a development as on breast milk.

EXPERIMENTS WITH SWINE FAT IN INFANT FEEDING.

DR. JOHN ZAHORSKY, St. Louis.—Human milk contains 4 to 7 per cent. of fat and from this half of the body energy is furnished. It is hard to supply a substitute fat to the young infant; bovine fat must be changed to adapt it to the infant's needs. The practitioner in the United States is partial to the use of fat in infant feeding but it is hard to skim milk down to make the amount of fat digestible by the infant. Many young infants cannot digest at all the fat of cows' milk. Other fats, such as cod liver oil and olive oil have been tried but are not entirely satisfactory. I have observed good results from the use of swine fat and the chemical analysis resembles more closely the fat of human milk. It is almost free from volatile acids. For this feeding pure lard may be used. In our experiments a pure leaf lard was used. The popular prejudice against lard has been deeply rooted as it is supposed to be greasy and indigestible. In my experience, however, lard can be safely used. The cases in this experiment were twelve in number, all institutional infants. Those that were fed on swine fat did better than other infants and looked in better condition. The difference was so noticeable that ladies who wished to adopt children always chose my lard fed babies as they looked so much better than the other infants. The lard was poured into the bottle of milk and the milk shaken. If the infant took the bottle readily nothing was done. Sometimes the infant refused the

bottle. When the lard amounted to more than 3 per cent. regurgitation followed. Green stools were frequently observed, but the usual stools were yellow; no attention was paid to green stools unless the babies showed signs of overfeeding. In following the experiment I ran the risk of causing digestive disturbance. In cases fed with lard gains were 28 grams daily, 14 grams daily, and 23 grams daily respectively. One infant showed a gain of 23 grams daily for ninety-seven days. To push the experiment we fed the babies as much as they would take and as carelessly as the mothers would feed them in their homes. There were no cases of severe digestive disturbances. I believe, however, that it would not be advisable in many cases to use more than 1 or 2 per cent. of lard, to start with; then more might be safely added up to 3 or 4 per cent. The development of these children with lard feeding was very satisfactory.

THE ABSORPTION OF FAT FROM THE INTESTINAL TRACT OF THE ACTIVELY TUBERCULOUS CHILD.

DR. F. W. SCHULTZ, Minneapolis.—It is usual in cases of tuberculosis in children to give a diet rich in fat to get a deposit of fat in the tissues. Diet in these cases can affect the tissues to a marked degree and can influence resistance of the tissues. Both the fat metabolism and water metabolism are of importance in the cases. The amount of water contained in tissue depends not only on increase or decrease of fat substance but on the residual fat in the tissues. With a food low in protein and rich in carbohydrate it is found that animals are less resistant to tuberculosis; with a fat-rich diet they are more resistant to tuberculosis. A relation has been shown to exist between water retention in the tissues and immunity and in scrofula and the exudatory diathesis it is shown that overfeeding or forced feeding influences these symptoms; if the child can be made to gain in weight the condition improves. Reactions are more prompt if milk, eggs and concentrated sugars form the chief ingredients of the diet. In scrofulous children it is not known just what part of the metabolism is affected, but the fat metabolism and salt metabolism are suspected. The importance of fat metabolism to the tuberculous child brings up the question of fat tolerance. In peritoneal tuberculosis the absorption is often markedly diminished. This is caused by blocking of the lymphatic channels. In eleven cases of tuberculosis of the exudatory or scrofulous type, a fat-rich diet with cream, milk, butter, eggs and carbohydrates was given for several days and the fat estimation in the feces determined. The fat absorption was found to be distinctly diminished in the glandular cases; and was found to be normal in the other cases. In cases where fat absorption was not normal the addition of carbohydrate to the diet improved absorption. This series of cases was too small to warrant final conclusions, but high fat feeding seemed to be indicated in most forms of tuberculosis. Fat absorption was abnormal only in glandular cases. Individual cases must be studied but conclusions seem to show that the diet which gives most fat with least retention of water is the most favorable to the tuberculous child.

DR. TALBOT, Boston.—In the question of giving fat to the tuberculous child it is a mechanical matter whether fat can be absorbed or not. This depends upon whether the lymphatics are blocked. In definite tuberculosis of the mesenteric glands where it seems as if there were masses, fat can get round in some instances. The stools must be examined under the microscope to see if there is an absorption of fat or not.

THE INFLUENCE OF STARCH ON INFANT DIGESTION.

DR. T. S. SOUTHWORTH, New York.—To prevent misconception I will say that this paper is no argument for excessive starch feeding. Starchy cereals are given for two reasons: cereals as diluents prevent large tough curds, and also render such curds permeable by the gastric juice. The vegetable proteins supplement the animal proteins of the milk. It would seem, however, that there is another field of action for starchy cereals; this is no longer in the gastric digestion but is transferred to the intestinal tract. The part played here is important. The stomach is largely a receiving station and comparatively little absorption takes place there. Nutrition takes place mainly in the small intestine where peristalsis churns the food and mixes the secretions with the mass. If peristalsis be hurried disturbances may arise from fermentation or from abnormal cleavage. Fermentation of the carbohydrates in the small intestine irritates the mucosa and the irritation causes loose movements and interferes with absorption. Fats as well as sugars produce this irritation of the mucosa and in cases of irritation caused by fat of cows' milk, malt soup may be given or maltose and dextrin without causing diarrhea. In use of buttermilk for infants a food composed of ordinary buttermilk, boiled rice or flour and cane sugar is given and the virtues of this food depends upon the low fat content. Schloss's milk given with flour is better for young infants. Marasmic infants also can stand it better with the use of flour. One must ask why cereal additions play an important part. It is time to give scientific reasons for what has always been empirically conceded in infant feeding. There seems to be a protective action in gelatinized starch against too high fats, whether in breast milk or cows' milk as well as against too large quantities of sugar. This explains why barley water is of use for marasmic infants. When irritation is shown in the stools the use of a cereal diluent may act not only on the stomach but as a curative agent in intestinal indigestion. There seems to be more than one way of giving starch to influence digestion. Carbohydrates digest proteins more readily in an alkaline media. In salt formation starch is one of the vital factors. Thus the rôle played by starch in infant feeding is a varied one. Whether its action is simple or complex it helps us in giving desired results which without it would not be obtainable. It has a recognized usefulness in selected cases but is generally unnecessary before the seventh month. Its excessive use disturbs digestion but young infants can digest moderate quantities of boiled starch.

THE METABOLISM OF CARBOHYDRATES WITH SPECIAL REFERENCE TO
ITS EFFECT ON THE ABSORPTION OF FAT AND NITROGEN
AND ON THE RETENTION OF SALTS.

DRS. F. B. TALBOT and LEWIS W. HILL, Boston (read by Dr. Talbot).—This investigation was undertaken to increase our knowledge of the effect of lactose on the retention of various food elements. The infant examined had suffered from digestive disturbance. It was admitted to the Massachusetts General Hospital about the middle of September. It was much under weight and had very poor digestion. The baby began to gain and get stronger and at 5 months old the weight was 9 pounds. In the feeding experiment we tried to keep the fat the same and the protein the same and gave increased percentages of sugar in successive periods. The baby gained weight rapidly on this treatment. We started with 135 calories per kilo of body weight and increased to 171 calories per kilo. At this point the baby got diarrhea with green stools containing soft fatty curds; it was immediately put back upon the formula on which it had been doing well before. It lost weight after the diarrhea started. After this attack it was getting 115 calories per kilo of body weight. During the experiment the urine never contained sugar; there was no reaction in temperature when the diarrhea occurred. We found that with increased amount of sugar there was an increased retention of protein. With the increase of food there was a change in the retention of ash and this retention of ash did not go down with the increasing amount of sugar. Also the increased amount of sugar had no effect upon the absorption of fat or protein. They remained normal; neither was there any effect upon the absorption of ash. When the diarrhea came the absorption of fat dropped from 90 to 75 per cent. and the stools contained fatty curds. With this the absorption of nitrogen also dropped from 90 to 80 per cent. and there were a few casein curds in the stools. One interesting point brought out by the investigation was that when the diarrhea came the balance of ash which had previously been positive was lost. When the diarrhea stopped the percentage of ash became positive. We also tried to determine the acidity of the stools. No very good method exists for this experiment. We titrated it against decinormal sodium hydrate and in the first periods of the experiment the acidity was the same, but with the diarrhea a very marked acidity occurred, and with the acidity the buttocks of the baby were burned. Butyric, lactic and acinic acids were isolated. This shows how chemical functions act during an acid diarrhea although this may be the rule for only this one baby; but the suggestion from a clinical point of view is that there was a loss of fat with marked acidity and that when the sugar was lost acids were the result of the breaking down of the lactose. Taking the fat alone this baby lost in the stools fifteen calories per kilo per day which may explain why babies do not gain when getting a sufficient number of calories.

DR. DOUGLAS, Detroit.—There is one point that I should like to make and that is that in several patent foods, such as Horlick's,

Nestle's and Mellin's there is an excessive amount of sugar. We see this clinically but cannot show it in figures. I tell the mother that such and such a formula may be tried but whatever we do we must not loosen the bowels. The majority of cases suffer from too much sugar and before the child will thrive it must have firm stools.

DR. MORSE, Boston.—I would like to ask two questions: first, are we justified in concluding that simple variations in the percentage of sugar have no influence on the absorption of fat and nitrogen; second, how much of the loss of fat during the diarrhea was chemical and how much was mechanical?

DR. ZAHORSKY, St. Louis.—There should be some test of the fermentability of the sugar. Some preparations are very quickly fermentable and some are not. Cane sugar, milk sugar, and malt sugar, tested with the saccharometer are not easily fermentable, but malt soup easily ferments. I believe that the latter contains dextrin and not malt sugar and that is why it is more easily fermentable.

DR. ST. CLAIR, Philadelphia.—In regard to Dr. Southworth's paper I think that in disturbances of digestion the use of starch is especially valuable. In the normal baby as well we find starch very helpful. In fermentative and putrefactive symptoms it acts as a protective. In hospitals barley water is used temporarily but babies do not thrive upon it for long.

DR. MACLANAHAN, Omaha.—I should like to know exactly what is meant by cooked starch. What are the cereals that make a good gruel? Mothers are constantly asking for patent foods that they can prepare themselves easily. Careful mothers speak about the expense of foods that require a great deal of cooking. Perhaps Dr. Southworth will tell us of a good form of cooked starch, so that we can instruct the mothers.

DR. HELMHOLZ, Chicago.—I should like to ask Dr. Talbot a question. In considering periods two and three with the very great gains and relatively small losses of ash and nitrogen together with the large percentages of sugar, is there a possibility of a great deal of sugar being stored in the organism and with it water, which after the diarrhea reduced the weight of the infant very markedly.

DR. SOUTHWORTH, New York.—Dr. Talbot has shown us graphically what we have long suspected from clinical experience; rapid peristalsis interferes with the absorption of fat and nitrogen. Loss of ash is perhaps due to increased acidity of the intestinal contents and the amount of substances that they have to neutralize. In regard to Dr. Zahorsky's question, I know that dextrin is often constipating; maltose is rather more laxative. In reply to Dr. McLanahan, I am not advocating any particular form of starch, but merely giving the reasons why I have gotten good results from the use of starch. We can arrive at good results without using patent foods. There are a number of proprietary foods that can be used. As to the question of expense for the mothers, the expense may be put into the cooking or into the material. Arrowroot or rice flour may be easily obtained.

DR. TALBOT, Boston.—Dr. Morse asks whether the loss of fat and

nitrogen was chemical or mechanical. There is a certain limit for fat in all babies, and if the fat has gone above that limit there must be indigestion; further there is a difference in the amount of sugar that can be given; some babies can take only 3 per cent., some can take 15 per cent. The proportion of other food components with the fat component that can be given without doing harm must be determined. When the sugar became fermented the explanation would be that intestinal bacteria that are normally saprophytic there, had so much food that they became more powerful and worked on the sugar with greater ease. These bacteria act possibly on the broken down sugar to such an extent that a large amount of acid is formed in the intestine and the acid formed is strong enough to form an irritant in the intestinal canal. Gas and mucous is formed and the intestinal canal tries to get rid of the irritant; there is increased peristalsis and the food is not left so long in the intestinal canal as usual. It is probable that the increased peristalsis lessens the fat and protein in the intestine. Small variations in the percentages of sugar probably made no difference to the nitrogen and ash since the amount of sugar was below the physiological limits of digestion; above that it would make a great deal of difference. In reference to retention of water I could not find any evidence of this although it is hard to tell whether water is retained or not. Sugar may have been converted into fat as large amounts of fat may be formed by high sugar feeding. It is conceivable that this baby was depositing large amounts of fat by conversion of sugar.

Session of Thursday, June 25.

BLOOD PRESSURE IN NORMAL CHILDREN.

DRS. C. F. JUDSON, Philadelphia, and PERCIVAL NICHOLSON, Ardmore, Pa. (Read by Dr. Nicholson).—Accurate blood pressure examinations in children are very important and there are several general factors which materially influence blood pressure such as the contracting force and rate of the heart; the peripheral resistance of the capillaries; the elasticity of the vessel walls; and the character of the blood, its velocity and volume, etc. The contracting force and rate of the heart is the most important point; the peripheral resistance is less in children than in adults and the vessels less stable in equilibrium, thus causing variations in blood pressure. Physical facts have a great influence on the blood pressure in children; the height and weight of the child; the influence of sex—the pressure being higher in males; the time of day—pressure being higher at the end of the day and dropping gradually during sleep. The Riva-Rocci instrument used by Cook with a 5-cm. cuff gives no diastolic pressure. Kaupe used the Riva-Rocci instrument with a 12-cm. cuff which gave the systolic pressure at the disappearance and reappearance of the radial pulse. At Sahli's clinic the systolic pressure was estimated by palpation method and the diastolic by changes in the pulse wave. Katzenberger made 241 observations using a mercurial instrument

with an arm band of 9.5 cm. The diastolic pressure was noted at the time of disappearance of all sound. The most recent work of this kind has been by Mello Leitao upon healthy children up to six years of age. The Erlanger apparatus was used with a 6-cm. cuff applied to the thigh and the pulse was felt in the posterior tibial artery. The oldest method is the palpation, but this does not give the diastolic pressure and is therefore incomplete. The oscillatory method of von Recklinghausen is not altogether reliable and the results are open to question. The Erlanger recording apparatus with a kymograph drum is difficult to manipulate and the oscillatory method with children is simpler, but the nervousness of the child often interferes with the results. The auscultatory method of Korotcoff in 1906 is simple. The systolic pressure is indicated by the first clear sound. In most children it can be heard. The stethoscope should be below the edge of the cuff and the arm should be used. After the systolic pressure the diastolic can be obtained. A murmur is heard at the time of the second sound which replaces the clear first sound. The third phase is a tapping sound. The fourth phase is a duller sound and at the fifth phase all sounds disappear. Some observers think that the dull fourth sound is the diastolic pressure. In 1200 observations by Schrupf and Zabel by auscultation the dull fourth sound has been taken for the diastolic pressure. In adjusting the cuff the arm band must be snug and the cuff must be placed upon the artery at the elbow. It is better to take the blood pressure between meals and with the patient in a reclining position. In the modified Erlanger apparatus a U-tube is used with a double scale for reading the mercurial column, with an ivory float which works up and down in a metal trough with a guide ring. The recording portion of the instrument has two movable arms connected with the mercury float which mark the activity of the blood in the artery under observation. The arm attached to the mercury is placed in contact with the smoked drum and the drum rotated once to mark a base line. The upper indicator records the height of the mercury columns and the lower shows the pulsation of the artery. The point where the first increase in oscillations occurs is the systolic pressure. The pressure is measured by milligrams of mercury and the figures must be doubled to allow for depression of one arm of the U-tube while the other is being elevated. The diastolic pressure is where the oscillations begin to diminish in height, the second maximal oscillation—the correct diastolic pressure. Results by this method show a remarkable accuracy when compared with the results of the auscultation method and oscillation method. It is found that the widest variations occur between ten and fourteen years, but the variations do not exceed 5 mmg. in two-thirds of the cases. The systolic pressure is found to rise between the third and tenth year; it varies from 91 at three years to 105.5 at fourteen years. The diastolic pressure remains level and the pulse pressure increases in proportion. The systolic pressure from four to fourteen years is 16 per cent. and the diastolic pressure for the same length of time is 45 per cent. In these estimations the auscultation method and the method of Erlanger show remarkable

uniformity. The determination of the pulse pressure indicates the peripheral resistance and is the most important thing to be determined in the examination of the child.

A STUDY OF THE BLOOD PRESSURE IN ANEMIA IN INFANCY.

DRS. JOHN LOVETT MORSE and E. T. WYMAN, Boston (Read by Dr. Morse).—I would like to say that we are amateurs and not professionals in this line of work. There seems to be very little data in literature on the blood pressure in infants and nothing at all as to blood pressure in anemia in infants. It seemed advisable first to examine normal infants, and then a series of poorly nourished babies were examined to determine what connection nutrition had with blood pressure. The tests were made on the arm whenever possible and when this could not be done, they were made upon the thigh. A sphygmomanometer was used with a band of 5 cm. The systolic pressure was read when the sound was first heard and the diastolic pressure was read when the sound changed from sharp to dull. In sixty-two normal babies the average pressure was 90 diastolic and the average systolic pressure was 72 in males and in females 66. The pressure both diastolic and systolic was slightly higher in the male. The highest diastolic pressure in females was 84 and the lowest 40. There might have been errors in these observations; the differences seem very large. There seems to be a rise of pressure, both diastolic and systolic, in the second year over the first. In poorly nourished babies twenty-seven observations were made and the systolic pressure averaged 89, with diastolic 53; the pulse pressure was 25. In comparing the normal with the poorly nourished children the systolic pressure was found to be the same; the diastolic pressure lower and the pulse pressure higher on an average. In those suffering from anemia the systolic pressure was higher and the diastolic lower with a higher pulse pressure. There was no definite relation between the pulse pressure and the degree of anemia. In one case of an anemic baby, very pale but not badly nourished, there was a pulse pressure of 124; diastolic pressure 0; systolic pressure 124. The heart was not enlarged. A second case of a baby, thin, fairly developed and nourished, markedly pale, had rickets, liver and spleen enlarged, heart normal size, with blood count of 2,000,000 red blood cells and Hgb. of 40 per cent., the systolic pressure was 124, diastolic 30 and pulse pressure 94. Observations show that with disturbance of nutrition there is generally lowering of the diastolic pressure and increase in pulse pressure. The systolic pressure rises with the increase of the anemia. These observations are too few to warrant any definite conclusions as to their cause.

DR. MICHAEL, Chicago.—Two years ago I made a number of examinations on blood pressure in children. The average ages were from six to fourteen years. I estimated the areas per square millimeter over which the pressure circulated. I measured the circumference of the arm and multiplied that by the width of the cuff and

divided the height of the mercurial column by this sum. I found very little difference in the results in the fifth, sixth, or seventh years of age and those of fourteen years. The results were practically the same. This quotient would give a better idea of the blood pressure than the height of the mercurial column. In the normal child the blood pressure was about the same; age had very little to do with it. The physical condition must be taken into account in taking blood-pressure readings.

DR. HILL, Philadelphia.—We took blood-pressure readings in babies with gastroenteritis. We divided our six-inch cuff exactly in half which I think is the better way. In these cases Hutchinson has claimed there is a lowering of the blood pressure. He used palpation to estimate systolic blood pressure. The pulse pressure seems to me to have more bearing than the systolic pressure. In our cases the systolic pressure was a little higher. The pulse pressure was about thirty. We gave adrenalin in several cases but did not see any benefit from it. A cuff which has been introduced lately with the stethoscope in the cuff is the best I have seen.

DR. BISHOP, New York.—It is extremely important that this matter of diastolic pressure examination should come into general use. In some cases it is of more importance than the systolic pressure and will throw more light on the case. The elevation of the diastolic pressure has a very close relationship to renal complications and the estimation of the diastolic pressure is a great help in the diagnosis of aortic regurgitation. When the diastolic pressure is low there is a good deal of blood regurgitated. In children the blood-pressure estimations are more reliable than in adults as there is less psychic influence. When the heart is affected in a child there is a rise in blood pressure in the effort of the heart to compensate and the higher the pressure goes the worse the case is. Shortly before death the heart gives out. In the last stages of cardiac disease there is a very high blood pressure.

DR. RITTER, Chicago.—Is the blood pressure taken with the patient in different positions? There is a difference in the blood pressure when standing, lying down and sitting. This variation is greater in health than in disease.

DR. HAMILL, Philadelphia.—This is rather a difficult matter. The pressure in normal children must first be determined or our ideas are apt to be somewhat indefinite. When blood pressure apparatus first came into use I started to determine as many pressures as possible. Diastolic pressure was determined by auscultation method. This proved unsatisfactory. My systolic pressure results corresponded closely with the systolic pressure results given here. Studies on this subject should be of the utmost value.

DR. JUDSON, New York.—I do not see the advantage of dividing the area into the quotient as stated by Dr. Michael. I think it only adds to the difficulties.

DR. NICHOLSON.—I think there is an advantage in placing the pneumatic pad over the line of the artery. I think the insertion of the stethoscope destroys the fitting of the cuff. I believe an enor-

mous number of observations should be made before drawing conclusions. The nervous instability in gastroenteritis cases is very great and this is an important matter with children. In regard to the position of the patient, I have not had time to go into that matter myself, but I believe Dr. Ward Crampton in his experiments with school children has gone very thoroughly into the matter and has written an article on his conclusions. At the age of puberty there is a gradual rise of blood pressure; the heart enlarges and the vessels become smaller. The high blood pressure in boys of fifteen or sixteen is due to this condition.

PROGNOSIS AND DIAGNOSIS OF CONGENITAL CARDIAC DISEASE.

DR. CHARLES DUNN, Boston.—In 1901 in Vienna I undertook a special study in the obstetrical division of a large hospital, on cases of congenital cardiac disease, which came to autopsy. Later I have added a few cases to my results of that time and they number now forty in all. I found that I must disagree with the authorities in the descriptions of various cardiac lesions. In the literature the cases were described in a way that was of very little help to students. The diagnosis was difficult to make from clinical data and in the teachings much confusion was found and I was obliged to make some of my conclusions in spite of the literature. Many of the statements made by men of high authority did not seem to be justified. The chief fault seemed to be that the symptom complex seen in cases where several lesions existed was confused with cases with a single lesion. Therefore in teaching students I have been biased by my own study. I may be wrong on some points but I will present my cases for comparison with the experience of others. In this series the diagnosis made before death was confirmed at autopsy in forty cases but there were eight additional cases in which the physical examination failed to give any evidence of cardiac lesion. In four cases a diagnosis was made but at autopsy the heart was found normal. In the eight cases giving no clinical evidence there was an open foramen ovale. Other lesions found at autopsy were—pulmonary stenosis, sixteen cases; deficient ventricular septum, sixteen cases; open foramen ovale alone, two cases; congenital malformation of pulmonary aorta, one case; deficient septum with pulmonary stenosis, seven cases; open foramen ovale was found with other lesions in several cases; by itself it has very little clinical significance. The most prevalent information as to pulmonary stenosis is that it is rare but it was found in this series in sixteen cases as the sole lesion. All babies died shortly after birth where this lesion was found; none of them lived more than three months and all were blue babies. Among children who survived for longer periods of time there were no cases of pulmonary stenosis alone. Owing to the difficulty of obtaining autopsies comparatively few are performed and even when autopsy is granted the findings cannot be taken as a measure of the frequency of the lesion but rather of its fatality. Autopsy findings prove that pulmonary stenosis is frequently fatal rather than

a frequent lesion. The clinical diagnostic points in these cases were frequent cyanosis, malnutrition, poor development, clubbing of the fingers. In all forty cases a murmur was present (except in one case) this was always systolic in character, not continued through diastole. In pulmonary stenosis as the sole lesion, the cases all showed cyanosis. Ten cases showed slight enlargement of the area of dulness; nine cases showed systolic thrill. In pulmonary stenosis enlargement might be expected but some cases died before enlargement occurred. Later it was always found and this should be an essential diagnostic sign in these cases and early death should be considered an essential of pulmonary stenosis alone. In eight cases this lesion was associated with other symptoms; either accompanied with deficient interventricular septum of the heart or accompanied with open ductus arteriosus. This type was associated with a murmur transmitted into the neck. Three cases had cyanosis, cardiac enlargement and systolic thrill. The combination of cyanosis with other signs is sufficient for a diagnosis. In those babies who survive pulmonary stenosis is associated with other lesions. In these cases open ductus arteriosus is a help rather than a hindrance to the circulation and interposes no obstruction to it. It provides a means for the blood to pass from the right heart to the left. In fourteen cases that survived there was an open ductus arteriosus. The conclusions of these studies are therefore: If the baby dies shortly after birth there is pulmonary stenosis alone. If it survives it has also open ductus arteriosus. The murmur is then transmitted to the neck. With deficient interventricular septum alone the murmur is not transmitted to the neck. Cases showing murmur without cyanosis or enlargement and where the murmur is not transmitted to the vessels of the neck have open ductus arteriosus alone.

DR. SCHLUTZ, Minneapolis.—I believe that pulmonary stenosis is responsible for a large number of deaths. I do not believe there is any reference to this fact in the literature.

DR. HELMHOLZ, Chicago.—This paper has been exceedingly helpful in differentiating different lesions. The signs are frequently very confusing. What is open foramen ovale? My experience has been that it is always patent. Is a differentiation made in the size of the opening?

DR. ZAHORSKY, St. Louis.—One lesion, the transposition of the vessel, was not mentioned. This is frequent in cases of cyanosis. I believe that when a child has congenital heart disease, open foramen ovale is a safety valve for the circulating blood. In a case of a child of ten years of age who had persistent cyanosis I found the heart perfectly normal except for hypertrophy of the right heart. I infer that this was a case of pulmonary stenosis with patent foramen ovale.

DR. BISHOP, New York.—Some of these cases with congenital heart lesions do survive to a good age and manage to do good work. I know a man who was vice-president of a railroad. He survived to fifty-six years of age and was a hard worker. When he was fourteen, Dr. Babcock made a diagnosis of congenital heart lesion. He had a very high blood pressure, the effort of the heart to compensate

for this condition. When he died his blood pressure was 320. The prognosis is better then if the patient can survive the early stage.

DR. ALLEN, Holyoke.—I should like to know if any members present have noted cases of more than one blue baby in a family. I have been called in to see a case of a blue baby that died and was told that two blue babies had died in that family.

DR. SEDGWICK, Minneapolis.—Dr. Zahorsky has spoken of the fact that the impression is that open foramen ovale is very important. I have spoken of this to pathologists. In the minds of pathologists and of students undue importance seems to me to be given to this lesion.

DR. MORSE, Boston.—One of my objects in life is to convince the profession that open foramen ovale is not the only lesion in babies. One person tried to convince me that this was the cause of cirrhosis of the liver in a child. I know of a case of a boy of sixteen who has had a heart murmur since two years of age. The boy has been allowed to take boxing lessons as he is a quarrelsome boy and needs to defend himself. He has never had any symptoms although the murmur is heard all over his chest.

DR. DUNN.—The question is one of the size of the opening. I disregard it in all cases combined with other lesions. In two cases where it was the sole lesion there was slight cyanosis. Usually it has no clinical significance. In congenital abnormalities of the vessels a correct diagnosis was made in life and confirmed at autopsy. A child with cyanosis, marked enlargement and no murmur had congenital hypoplasia of the pulmonary aorta; one vessel was small, the other absent. As to prognosis, all combinations of lesions are susceptible of long life, but their nutrition suffers. Some, even with pulmonary stenosis, live to ten or eleven years. This lesion with open ductus arteriosus is favorable to a greater proportion of survivals. An obliterative endarteritis can take place later.

FURTHER OBSERVATIONS CONCERNING THE RELATION OF HEAT TO INFANT MORTALITY.

DR. HENRY F. HELMHOLZ, Chicago.—During the summer of 1912 we began the study of the influence of heat on healthy infants. A number of infants from the Infant Welfare Stations were daily visited in their homes. The maximal and minimal temperatures were taken, notes made on the babies' condition, passages of the bowels, feedings, and temperature of the child. The work was continued in 1913 and forty-six cases were observed for a period of over two months. The room temperature in relation to the temperature of the infant was studied and also the temperature of the room on the preceding day. In eighteen cases of infants with hyperthermia the room was 90° in twelve instances. In twenty-one cases that had no rise of temperature the room was above 90° in thirteen cases. When the room temperature was above 90° there were as many fever cases as cases without fever; no definite relationship to high room temperature was found. The cause for gastrointestinal

disturbances or temperature in the child was found usually to be carelessness on the part of the mother. The infant was found to be able to stand a pretty high room temperature if properly cared for and to be able to adjust itself much better than is usually supposed. An analysis of six deaths that occurred between July 28-31, a period of greatest heat, showed that in three cases the mothers neglected to follow instructions; one died from overfeeding, two were atrophic infants. The regulation of clothing of the infant is a very important factor in hot weather. The mothers must be warned not to over-clothe the baby.

DR. ROYSTER, Norfolk, Va.—Three years ago I undertook a study of radiation as far as barometric conditions were concerned. I believe sufficient attention is not given to humidity. A child can stand much greater heat without humidity and consequently with more radiation. We must also consider home environment. Liefmann and Lindemann have ignored the question of humidity. In Berlin this is a negligible factor; they consider a humidity of forty-five high in Berlin; in my city it is rarely under 85 per cent. In private practice we find that rich children do not suffer from summer diarrhea for several days later than poor children. The temperatures are higher in the poorer houses, but here the question of clothing is a very important one. In the hot weather I send notices to my patients about the clothing of the children. I tell the mothers to keep nothing on but the napkin and if the people can afford an electric fan the child does better. The question of education of the mothers comes in here and they should be impressed with the fact that it is easier to prevent than to cure.

DR. LEVY, Newark.—There are many factors to be considered. The effect of heat on a baby in a room with five or six persons is more marked. The baby does better when there is a current of air through the room. The air current determines the radiation of heat. The condition of the baby will make the greatest difference when it has to stand the hot weather. When a new station is started for infant welfare it should be started six months before the summer begins to educate the mothers first as to how to mitigate the effects of heat for the child.

DR. SMITH, Boston.—Dr. Royster's point should be emphasized. The humidity is a very important factor. In our experience with the Floating Hospital it is after the days with a high humidity that there are a number of admissions of exhausted children. These children are suffering from disturbances due to lack of adjustment. They are treated best by starvation, and evaporation from the surface of the body gives the most relief.

DR. DOUGLAS, Detroit.—I educate my patients in anticipation of the hot weather. Food must be reduced. Evaporation must be considered and the little ones should be allowed to be without clothing in the house.

DR. ZAHORSKY, St. Louis.—The subject of heat and summer diarrhea is very complex. Summer mortality is not the same as summer diarrhea. The direct external application of heat does not

produce diarrhea. The proof is all the other way. I am not at all convinced that heat produces diarrhea. Three weeks ago we had a temperature of 100° in St. Louis and had no diarrhea. There are numerous atrophic infants with a low resistance who succumb readily to the heat. Prophylactic measures to keep the baby comfortable should be practised.

DR. BUTTERWORTH, New Orleans.—This is a very complex, subject and influenced by local conditions. In New Orleans the number of cases of gastrointestinal disturbance are few. We lose more infants in April than in hot weather. Infants do not seem to be able to adapt themselves to sudden changes in temperature as well as adults. The nervous system of the infant is immature and unequal to sudden changes.

DR. BURTON, Albuquerque, Mexico.—We have a city of 20,000 people. The cases of gastrointestinal indigestion are few during the summer. We have a great deal of difference in temperature by day and night. We keep the infants in the shade during the day time.

DR. ILWAY, New York.—Dr. Zahorsky raised the question as to whether heat alone is the cause of disturbance. I believe the summer heat has a remarkably depressing effect on the nervous system, especially in tenement houses where there is little ventilation. Children here are apt to have diarrhea. Heat alone is not the cause, because they do not have diarrhea in the country. Heat can cause diarrhea in an adult because the nervous system is upset. It is a house disease. If you keep the child in the air it will be all right.

DR. ELIAS, Asheville.—We have an elevation at Asheville of 3000 feet. In our experience we have more diarrhea in the country, contrary to what Dr. Ilway has said. In the country flies have been unusually bad and we attribute the cases to an unusual number of flies owing to lack of moisture. Atrophic babies do well with us.

DR. MCCLEAVE, Berkeley, Cal.—It is interesting to hear Eastern men speak of a temperature of 90° F. We have temperatures well above 100, sometimes 115 to 120. It is clear that heat has no effect in itself or we have a different heat. We have no summer diarrhea. The problem must be a very complex one and we have a great deal to learn in regard to it.

DR. HELMHOLZ.—I am glad to hear Dr. Royster state that heat is a negative factor. A nurse should go into the home every day to see that the child is suitably clothed. I agree with Dr. Butterworth that sudden drops of temperature are trying, and it is hard to clothe a child when there are great variations of temperature. We have a great deal of summer diarrhea in Chicago and we must find out what are the chief factors. By controlling the hygienic condition of the child we can influence the summer diarrhea remarkably.

A FURTHER CLINICAL STUDY OF THE EFFICIENCY OF SODIUM CHLORID IN THE THERAPEUTICS OF BRIGHT'S DISEASE.

DR. LOWENBERG, Philadelphia.—In September, 1912, I read a paper before the Section of Medicine on my experience in the use of

sodium chlorid in prevention of Bright's disease and edema. The results of hypodermoclysis were given, based on clinical data. The results in each instance were based upon definite biochemical phenomena and my results clinically confirmed the experimental observations of Fischer as to the nontoxicity of sodium chlorid and the relief of all cases by its use. My original observations were made before the publication of Fischer's work. In the discussion more light may be thrown on the question of whether sodium chlorid induces water retention. My own experience of the nature of nephritis and edema and of its therapy is different from that of Jerval and Widal. Edema may or may not occur with nephritis. In nephritis I believe that sodium chlorid is nontoxic and that it is helpful and curative. I have found that the administration of hypodermoclysis to individuals who have been dehydrated and demineralized has been helpful. Jacobi gives additional sodium chlorid in the milk formula and has never seen edema develop. Some workers have concluded that sodium chlorid retention is responsible for edema in infants. I believe that there is present some other influence such as an intestinal toxin irritating to the kidneys which results in albuminuria. Edema and albuminuria depend upon the tissue acids which cause solution of the gelatinous colloidal substances of the kidney and result in albuminuria. The mere presence of neutral salts will dissolve the acid in the acid-bound tissue. Nephritis is experimentally produced in rabbits by the injection of acid, and they can be cured by dissolving the acid with sodium chlorid. A salt free diet may lead to albuminuria and nephritis, due to low salt content of the body. Water washes out neutral salts and salt starvation leads to acidosis, cloudy swelling and albuminuria. I have been able to clinically confirm the statement that by use of salt the urinary output may be increased; accompanied by an alkali and with plenty of water it exercises an effect in nephritis. It is best given by rectum or intravenously.

DR. T. S. SOUTHWORTH, New York.—This use of sodium chlorid in nephritis is opposite to what we have usually heard. I think it is worth while to repeat a case in which Fischer's solution was used. A young adult had typhoid, acute nephritis and delirium, and with the solution the nephritis cleared up promptly. The salt had no deleterious effect. I am not in agreement with the idea that salt does not help.

DR. ZAHORSKY, St. Louis.—What is the difference between giving acetate of potassium with sodium and then giving plenty of plain water and in using hypodermoclysis?

DR. NICHOLSON, Ardmore, Pa.—In very toxic cases of diphtheria we have put salt solution into the bowel. This is found better than by mouth as it is absorbed by the rectum provided the right kind of apparatus is used.

DR. LOWENBERG.—In answer to Dr. Zahorsky I think that salt and alkali by mouth would be just as good.

THE USE AND ABUSE OF THE TONSILS.

Dr. JULIUS H. COMROE, York, Pa.—The tonsil is a hapless organ which has been accused of causing many pathological conditions. It has frequently been condemned without hearing and many tonsils which are sacrificed might have been saved. Tonsil surgery is not to be condemned, but more conservative views are to be recommended. The recommendations to parents by medical inspectors in New York to have the tonsils removed from school children amounted to 37,000 in a year. A letter was sent to several eminent specialists asking information as to the best operative treatment of enlarged tonsils and no two answers were in agreement. The organ has not, however, been proved to be valueless and its service is a protective one, constituting as it does the first line of defense against invasion of microorganisms. In good health the tonsils contain numerous leukocytes and in a limited degree the tonsils are phagocytic. The polymorphonuclears make their way there and the lymph current serves as a vehicle to wash away infecting organisms. Investigators have found that the fluids of the tonsils are infiltrated with lymphoid cells and that the plasma cells derived from these lymphocytes prove the tonsils physiologically active, and lymphocytes and leukocytes are stored there in large numbers. The epithelium of the crypts of the tonsils has been found to have a protective action against dust and microbes so that bacteria do not penetrate the tonsillar crypts. Whenever there is produced a change in the surface tension of the epithelium, by shock or some other means, then bacteria find an entrance. Thus streptococci are often found in the tonsillar crypts. The tonsil is found to possess an internal secretion possessing physiological and biological functions, somewhat similar to that of the suprarenal gland; and the eosinophilic cells, as in the thymus gland, have a secretive function. The secretions of the tonsil act as a lubricant to the pharynx and have an important influence on the timbre of the voice and in tone formation. The tone of the voice may be destroyed by tonsillectomy. The tonsils have been blamed as the portal of entry for serious systemic disease and the cry has been always to remove the tonsils. This is not such a simple matter, and many deaths have resulted from tonsil removal. The removal is often groundless and is only indicated when respiration is interfered with or when the tonsils are causing disease. The size of the tonsil is no indication of pathological condition and a small tonsil may be worse than one enlarged. If the nutrition of the child is interfered with then the removal of the tonsils is indicated, but this organ serves a physiological function and should not be indiscriminately sacrificed.

DR ZAHORSKY, St. Louis.—I believe that the tonsils are often necessary for the production of immunity. I know of cases where the tonsils have been removed and bronchitis and pneumonia have followed. Repeated attacks of bronchitis often follow tonsillectomy. Unless there is mechanical obstruction I do not think that tonsillectomy is indicated.

DR. SOUTHWORTH.—The tide is turning in this question of indiscriminate slaughter of the tonsils. In my experience in the dispensary cases are continually being sent in by school inspectors for tonsillectomy in which I have found no cause for removal. I believe the protective power of the tonsil lies in its internal secretion and not in its position as an outpost.

THE RELATION OF BOVINE TUBERCULOSIS TO EARLY TUBERCULOSIS
IN CHILDHOOD.

DR. T. A. McCLEAVE, Berkeley, Cal.—It is now generally conceded that tuberculous infection is incident to early life and that tuberculosis in origin is a disease of childhood. Prevention therefore should be in early life and a large expenditure of time and money on prevention is wasted unless engaged in prevention during childhood. No small proportion of infection is derived from tuberculous cattle and this infection can easily be controlled if once sufficient interest in the problem can be aroused. Theobald Smith has pointed out the differences between the human and bovine tubercle bacilli; the latter has less acid production and a pathogenicity for animals while the two types, human and bovine, possess characteristic reactions. The infection of human beings with the bovine type of bacillus has been supposed to be rare but the importance of the question demands more thorough investigation. The investigations of the British Royal Commission and the German Commission showed that pulmonary tuberculosis was always or nearly always human in type, but that in children a large percentage of abdominal, meningeal or lymphatic infection was of bovine origin. S. Knopf believed strongly in the transmission of tubercle bacilli from cattle and found that about 10 per cent. of cases were due to bovine infection. Rosenow believes that in children not less than 25 per cent. are due to bovine infection. Frazier of Edinburgh found 73 per cent. of cases under three years of age, of children fed with raw cows' milk, had the bovine form of infection. The possibility of the transmutation of bovine bacilli into human may be considered as a factor in infection. After entrance into the intestinal tract the bacilli injure and pass through the intestinal mucosa and by means of the lymph glands pass into the blood stream and after many years again become active as the human type of bacillus. Ravenel believes that infection of the lungs may be so produced. The proof of transmutation, however, is difficult owing to difficulties of the technic. If the tubercle bacillus is unable to change, however, it is different from bacteria in general. The greater incidence of bovine infection in early childhood and its decline in later childhood raises the question what becomes of the bovine bacilli? If the bacillus does not change it ought to be found in the adult cases, whereas the evidence is to the contrary. With this incidence of infection in infancy the tuberculosis of dairy cattle would appear a serious menace. This is somewhat contradicted by a report on autopsies of 730 children where the evidence was that 2 per cent. of cases were caused by intestinal invasion. This evidence,

however, is not entirely reliable as no one is able to clinically define the different types of infection. The efforts to render milk safe by the supervision of dairy cows therefore should be constant. Reports show that 20 to 30 per cent. of cattle are tuberculous and many give bacilli with their milk which are directly transmitted to the infant. The supervision of dairy hygiene is still too primitive and the cost of pure milk too high to rely entirely upon these as a safeguard. We must use means to make ordinary milk safe for the infant, or it will be a dangerous food. Pasteurization must be insisted upon and should be carried out in the home as commercial pasteurization is not always satisfactory and is worse than useless when not properly carried out. The milk can be brought to just below boiling point in the home before using. I am beginning to think that all milk should be so treated to prevent possible infection; even the better grades of milk may be unsafe.

DR. H. L. COIT, Newark.—Dr. McCleave's paper accentuates the importance of milk supervision and milk supply. I had an opportunity of bringing together three important authorities on bovine tuberculosis before the Federation of Medical Commissions, Ravenal, Park and Schraeder. Dr. Schraeder believes in the transmutation of the bovine into the human bacillus. Dr. Park thinks that this is difficult of proof. Important points in this problem to be considered are the regulation of tuberculin-tested cattle; the incidence of tubercle bacilli in ordinary milk; the identification of tuberculous cows; and the work of the veterinary in overlooking and supervising cattle. A constant decline in the percentage of tuberculous cattle has been shown since the supervision of the Medical Milk Commission. In five years the percentage has dropped from 31 per cent. to 4 per cent.

DR. RITTER, Chicago.—The glandular form of tuberculosis can be classed as a secondary form of the disease with lung involvement as the tertiary form. The glandular form should be the first treated. In regard to transmutation I do not believe that we have sufficient data to prove that. All the acid-fast bacilli are interrelated, but I do not believe that we can change one into the other. Koch and Ravenal are both right and both wrong. Koch contended that bovine bacilli would never produce pulmonary tuberculosis. The English Commission found that glandular tuberculosis was usually of bovine origin, but pleural and pulmonary tuberculosis was produced by the human type. The ingestion of milk with tubercle bacilli may produce glandular involvement and in that way develop a way for invasion of human bacilli.

DR. LEVY, Newark.—What is the explanation of the fact that children with glandular involvement do not develop pulmonary tuberculosis? Is it possible that the glandular type develops a certain immunity to the pulmonary type.

DR. SMITH, Boston.—This subject should receive more attention from physicians than it does. There are only two courses open to us—either to insist that all milk that comes to us raw should be from tuberculin tested herds, or that milk shall not be given raw.

DR. HELMHOLZ, Chicago.—We are not safe in giving certified

milk raw. In Washington tubercle bacilli have been found in certified milk and this can happen in spite of milk commissions. Dr. Coit referred to the last Congress of Hygiene and Demography at Washington. It seemed to me that in discussion there the balance of opinion was that the human organism and the bovine were distinct types. No transmutation has been proved.

DR. DOUGLAS, Detroit.—I do not believe any milk is safe. I take the precaution to have it pasteurized. There is no other way of protecting infants against tubercle bacilli.

DR. MCCLEAVE.—The question of transmutation is merely an argument but the effect is not a negligible matter. When simply heating the milk will make things safer for the child there would seem to be no excuse for not stamping out the disease. In reference to the question of immunity conferred by gland tuberculosis; these children do develop a certain immunity, yet some of Hamberger's experiments contradict this. Guinea-pigs behave like children with regard to glandular tuberculosis, and when these guinea-pigs are later injected with larger doses of the culture they develop generalized tuberculosis and die. There is only a partial immunity there. In regard to certified milk, I believe all grades of milk should be heated in the home. It is impossible to be sure that all cattle are tuberculin tested. They may not be far advanced in the disease and may not have reacted six months previously. The evidence shows that children get tuberculosis in this way. In regard to clinical evidence at postmortem, you cannot tell the difference between the bovine and the human form. Ravenal says that bacilli gain entrance into the intestine and pass through the intestinal wall into the thoracic duct and into the lungs, where the primary lesion takes place.

THORACIC COMPLICATIONS OF RICKETS.

DRS. J. HOWLAND and E. A. PARK, Baltimore (Read by Dr. Park).—The minor forms of rickets are not important and do not increase the danger from the disease, but some severe forms of rickets develop a thoracic deformity which may be fatal, and are perhaps the only way in which rickets can terminate life. This disease gives a characteristic deformity which is often misinterpreted. In this form the thorax often measures less than the head. Often it is seen at two or three years of age. The chest is shaped like a wedge with the anterior part of the chest corresponding to the narrow end of the wedge. The thorax is depressed, more on the right side than the left, as the heart protects the left side. With inspiration the deformity is increased and the depression is wider and deeper. The circumference of the chest may be diminished and is less in inspiration than in expiration by some millimeters. This thoracic deformity must bring about respiratory disturbance. The thorax has lost its rigidity. There is less calcium in the bony structure in rickets and the organic material is soft and yielding which often results in numerous fractures. In one case there were twenty fractures. This weakness of the thorax makes it unable to withstand the pull

of the diaphragm and atmospheric pressure. The atmospheric pressure causes the weak ribs to sink in and pulls in the cartilages, so that instead of being in a continuous line the cartilage attached to the ribs is bent to right angles. In this condition the efficiency of deep inspiration is much diminished. The deformity of the thorax exerts an influence on the thoracic contents. The lung is grooved on the surface and where the pressure has been there is a dark red atelectatic appearance. In front the lung is emphysematous and the atelectasis is by far the greatest in the posterior lobes, where the volume of the lung is most reduced; this is in the left more than the right. On section such a lung shows emphysema with atelectasis predominating. The heart in these cases presents a peculiar picture. The right heart is hypertrophied and the left normal. The right auricle is widely distended. On opening the heart the right ventricle shows hyperplasia. The cavity stands open, the trabeculæ are flattened out. The weight of the heart is increased and is in accordance with the weight of a normal child, whereas these children are very much under weight. These children present other evidences of rickets in the shape of the head; they cannot walk, sit or stand without assistance. They lie flat on the back; the respiration is unusually rapid, sometimes 80 to 100. The face is anxious. There is never dulness in the lungs but breath sounds are diminished. The picture is like pneumonia but there is no elevation of temperature and no leukocytosis. Death in these cases is due to failure of respiration by mechanical causes. The x-ray findings in these cases are typical and diagnostic.

DR. OSTHEIMER, Philadelphia.—The question of fractures in these cases is extremely interesting. I should like to ask whether the fractures occur at the same time or whether they continue to occur during the life time of the individual.

DR. HOWLAND, Baltimore.—These cases occur only in severe rickets. Milder forms show no such deformity. Rickets may run for several months or years with relapses and remissions. These fractures may occur during several years, generally from the first to the third year. At any time in a relapse a child may acquire a fracture. This condition is misinterpreted as being due to an infection, but this is not the case. It is often called pneumonia whereas it is not pneumonia at all. There is atelectasis of both lungs but no tetany of the bronchial muscles. The treatment must be nutritional and prophylactic.

DR. SOUTHWORTH, New York.—These cases are the only ones that directly cause death, but lesser degrees of rickets are contributory factors in deaths of children who contract pneumonia.

DR. MCKEE, Philadelphia.—This paper is a distinct contribution to our knowledge of rickets. Aside from the question of etiology our knowledge represents a closed chapter. In one of the x-ray pictures the shadow shows the thymus enlarged. Was this the case?

DR. PARK.—I agree with Dr. Southworth that a child who has a respiratory infection with a milder form of rickets is in very great danger. In regard to the fractures, these cases can be distin-

guished from *fragilitas osseum*, in which cases there are fractures of the extremities as well as the ribs. I at first reported one of these cases as *osteogenesis imperfecta*. The osteoporosis is extreme in rickets, but the condition is different from *osteogenesis imperfecta*. In regard to the shadow on the lantern slide I do not remember noticing that the thymus was enlarged. That might be the shadow of the superior vena cava.

FRAGILITAS OSSEUM.

DR. MAURICE OSTHEIMER, Philadelphia.—Cases of idiopathic *osteogenesis imperfecta* are identical with congenital *osteopsathyrosis* or congenital *osteomalacia*. We have used the term *fragilitas osseum* which includes two types of the disease, the fetal type occurring at birth and associated with imperfect bone formation and fractures occurring in infants; and cases where fractures occur in childhood, puberty and even in adult life. These children often survive but are crippled. Since 1897, 126 cases have been studied. Dr. Griffiths studied a series of these cases in which he excluded symptomatic cases for which any discoverable cause existed, such as tuberculosis of the bones, syphilis, or nervous affections. We have also excluded these cases. The report of a typical case is given here. The patient is a girl of Russian-Jewish parentage; she was first seen at three years of age; was breast fed for one year and after that carefully fed; never had any indigestion; there were three other children who gave no history of fractures; the patient's only previous illness was whooping cough; the mother stated that the child fractured her leg whenever she tried to stand up; at three years she fractured the humerus; the child was very spoiled and difficult to manage; physical examination showed good musculature; head and face broad with protuberances of the parietal bones; scleræ deep blue, clear; no cranial tabes; neck short; posterior glands hard; thorax pigeon-breasted; lungs normal; expansion good; heart, apex beat not visible; soft blowing systolic murmur; second pulmonic sound accentuated; pulse small; liver palpable; spleen not palpable; inguinal glands palpable; knee jerks normal; blood showed 3 per cent. eosinophiles; Wassermann reaction negative. Left humerus in plaster. The child developed a gonorrhœal vulvovaginitis and was sent to the Philadelphia Hospital. The parents soon took her away from there and kept her at home. She broke both femurs again at home. She recovered rapidly each time. When last seen she was able to walk. The parents never would consent to leave her in hospital. Her appearance when last seen was anemic. She had had nine fractures between one and one-half and four years; right femur, three fractures; left femur, five fractures; humerus, one fracture. The child has no sign of rickets. All the cases I have collected of this disease are of two types: (1) *osteogenesis imperfecta*, of which nine cases were born dead and thirty-five alive and in which the oldest lived twenty-two months; and (2) idiopathic *osteopsathyrosis*; among these cases the earliest fracture occurred at

birth and the latest case of fracture at forty-one years. The bones of the legs were most frequently broken. In 30 per cent. of these cases there were other cases in the family. Dark blue scleræ were frequently observed in these cases. In these cases the normal bone formation is checked; there is an increased absorption of the scanty bone trabeculæ; the bones lack calcium salt and there is a concentric bone atrophy. The bones become porous and very fragile. There is a functional inability of the periosteal osteoblasts and consequent diminution in periosteal formation.

REVIEWS.

THE PRACTICE OF PEDIATRICS. BY CHARLES GILMORE KERLEY, M. D., Professor of Diseases of Children, New York Polyclinic Medical School and Hospital. Octavo of 878 pages, 139 illustrations. Philadelphia and London: W. B. Saunders Company, 1914. Cloth, \$6.00 net; Half Morocco, \$7.50 net.

Dr. Kerley is to be congratulated on the favorable reception accorded his previous work on the treatment of diseases of children, of which the present is a more comprehensive edition. The attention extended to the question of symptoms and diagnoses has largely exceeded the limits of his previous work. A feature which adds greatly to the practical value of the book is the inclusion of a large number of illustrative case histories, each of which shows some peculiarity in the symptoms or a particular point in diagnosis or treatment. Dr. Kerley's extensive clinical experience and his ability as a teacher, particularly to postgraduate students, makes his book very valuable to the latter, as it contains an enormous fund of information. It is strictly up-to-date in every respect, including among other things a chapter on the vaccine therapy which is now so generally employed. Notwithstanding the theoretical value of the method, the practical application of the same has not always been encouraging and the author might profitably include a more pronounced warning as regards the indiscriminate use of the procedure. The remainder of this chapter on therapeutic measures is very valuable, however, and Dr. Kerley wisely refers to the necessity of educating the mother in attempting the successful practice of pediatrics. The therapeutic influence of remedies in the realm of drugs is also given their full import for nowhere else is the habit of indiscriminate dosing so prevalent as in the treatment of the complaints of children. Gymnastic therapeutics are also accorded the attention which they deserve, and Dr. Kerley has formulated a system of rules and regulations for the application of these procedures which are extremely valuable. He includes here the application of exercises in health as well as in the congenital ataxias and various paralytic disorders.

A very carefully compiled formulary is appended to the book and a considerable number of prescriptions included throughout the

text. The printing and illustrations of the work are deserving of commendation.

SURGICAL DISEASES OF CHILDREN. A Modern Treatise on Pediatric Surgery. By SAMUEL W. KELLEY, M. D., L. L. D. Illustrated. Second Edition, Revised and Enlarged. Price \$5.00 net. New York: E. B. Treat & Company, 1914.

The essential feature of this book is to present the differences between child-surgery and adult-surgery and between child-pathology and adult-pathology, a distinction which is not always recognized in general text-books on surgery and therefore deserves consideration in a separate volume. The first edition of this work was very favorably received, and in the second the author confesses to certain criticisms which have led to a number of changes. Among the additions to the present work are the description of transfusion with Brewer's tubes, arthroplasty, motion after dislocation and other joint injuries, anomalies and deformities of the skull, Abbott's method for scoliosis, tonsillectomy, fistulæ and cysts of the neck, and Cook's operation for relapsed club-foot. In the place of statistical arguments the author introduces case reports where their example would serve better than a general statement to present the subject. It is very satisfactory to find that a well-known pediatricist has taken the pains to present this very essential branch of his specialty in a form which is entirely surgical in its aspects, for pediatricists as a rule who have written on diseases of children have failed to include, or have passed by with scant reference, those diseases of children which can only be treated by surgical means.

The surgery of the bones and joints necessarily occupies a considerable portion of the book, but the surgery of the other organs is likewise considered in very satisfactory detail. It is quite remarkable that a work of 800 pages can be devoted exclusively to this subject, but on reading the book it is quite evident that the time is not wasted. The author is to be congratulated on the satisfactory response which his previous efforts have met with.

BRIEF OF CURRENT LITERATURE.

DISEASES OF CHILDREN.

Etiology of Epidemic Cretinism, Congenital Goiter, and Congenital Parathyroid Disease.—R. McCarrison (*Lancet*, Mar. 21, 1914) believes that the exciting agent or agents of goiter exist in the intestinal tract of sufferers. To identify such an agent or agents, he has fed white rats (1) on the filtrate of an emulsion of goitrous persons' feces, and (2) on aërobic and on anaërobic cultures of organisms grown from the feces of goitrous persons. Among the results noted are these: 1. Out of sixteen animals, born of a goitrous mother which consumed fecal filtrate prior to and during pregnancy, three were born cretins, while the forty-seven animals born in other cages showed no

clinical or pathological signs of this condition. 2. Of 31 animals, born of goitrous mothers, which consumed either fecal anaërobes or the filtrate of a fecal emulsion, fifteen were found to have congenital parathyroid disease. Of these, two-thirds were born of mothers consuming the anaërobic cultures, while one-third were born of a mother consuming a fecal filtrate which contained the toxic products of these anaërobes. The parathyroids were normal in sixteen animals born of goitrous mothers in other cages. 3. Fecal organisms which grow aërobically on agar, while capable of causing marked hyperplasia of the thyroid gland, do not appear to be capable of producing any ill-effect on the parathyroid glands. The writer concludes that of the offspring of goitrous parents a small percentage are born cretins, approximately 63 per cent. are born with congenital goiter, 32 per cent. are born with congenital parathyroid disease, and 33 per cent. are born with normal thyroid and parathyroid glands. Cretinism and congenital goiter are due to the action of toxic substances derived from the intestines of the goitrous mother on the fetal thyro-parathyroid mechanism. Cretinism represents the maximum, and comparatively rare, effect of these toxins; congenital goiter their minimum, and comparatively common, effect. Between these extremes all degrees of thyroid involvement may occur with or without associated swelling of the gland. Congenital parathyroid disease is due to the action on the fetal gland of the toxic products of organisms, present in the intestine of the goitrous mother, which are capable of growth under anaërobic conditions.

Koplik's Spots on the Tonsils.—S. R. Miller (*Johns Hopk. Hosp. Bull.*, 1914, xxv, 78) records the occurrence of Koplik's spots on the tonsils of a child subsequently found to be anaphylactic to egg-albumin. In this case, which later ran the typical course of measles, true Koplik spots occurred on and were curiously confined to the tonsils, preceding the rash and disappearing within two days after its appearance.

Treatment of Spasmophilia in Infancy.—Bernheim-Karrer (*Monatsschr. f. Kinderheil.*, Bd. xii, Nr. 8, 1914) says that it appears to be proven that alkalies have a stimulating or irritating effect on the brain and nervous system. A diminution of the alkaline earths was found in the brains of four children examined, who died of spasmophilic manifestations, and an increase of the alkalies. Aschenheim thinks that it is rather the relation of the alkalies and the alkaline earths that is important. Reiss found lithium and sodium stimulating, magnesium, calcium, ammonium, and potassium depressing. A salt-free diet has been found useful in these cases. Full milk with salt-free gruels and milk sugar has been also used successfully in convulsions. Little is really known as to the relation of the alkalies to spasmodic affections. Calcium increases the spasms in experimental tetanus. Zybel got an increased irritability from 3 gr. of potassium acetate in a case of convulsions. Rossiter caused a return of spasms after their cessation, in one case by the use of 100 c c. of 3 per cent. sodium chloride solution. The author found that maltosan caused increased weight in three children through reten-

tion of salts. Bruch showed that dried milk caused a balance of salts in the system. The action of salt ingestion in spasmophilia varies in different individuals. When calcium is lost there is a marked change in mineral metabolism and of irritability of the nervous system. Calcium may be retained through the administration of phosphated cod-liver oil, and a balance thus preserved. In potassium and sodium dioxides used with dried milk and phosphated cod-liver oil we have a therapy that is valuable in two ways in spasmodic cases. They cause a normal quotient between alkalies and earthy salts. This combination relieves as soon as possible the spasmodic symptoms. In twelve cases treated by the author, whose histories are given, all improved in from one to seventeen days, some becoming normal in twenty-four hours. When we return to whole milk the symptoms do not recur.

Relations between Pertussis and Spasmophilia.—Berta Erlanger (*Monatsschr. f. Kinderheil.*, Bd. xii., Nr. 8, 1914) examined sixty children with whooping-cough, between the ages of sixteen months and seven years, of whom forty-seven were nursing infants, at the Berlin hospital. All were tested electrically as to their muscle reactions. The author makes three groups, the first including the light cases, the second cases of medium severity, which had cyanosis, vomiting and severe seizures, the third including the very severe cases which had marked cyanosis, vomiting, apnea and convulsions. Of the sixty, eleven gave evidence of spasmophilia. All these had increased electrical irritability, a marked spasmodic diathesis, muscular cramp and convulsions. The author thinks that there is evidence of no marked effect on pertussis from the presence of the spasmodic diathesis. There are many other factors that influence it more markedly: such are constitutional anomalies, rickets, the exudative diathesis, neuropathies, and the especial type of epidemic. Of the sixty children examined 3 per cent. or seventeen were rachitic. Of group three, the severe cases, one-half had rickets, five had convulsions, and most of these were in the third group. Of the ten deaths, five of the children had convulsions, and eight had spasmodic symptoms.

The Child in the Tuberculous Milieu.—The children in 217 families, in which either the father or mother, or both, were found tuberculous, were investigated by M. Fishberg (*Arch. Pediatrics*. 1914, xxxi, 197). They were found living under conditions greatly favoring the dissemination of the disease. Of the 1129 persons comprised in this group of families, 792 were under fifteen years of age. Nearly all of these children were reared on breast milk, only 5.5 per cent. having been brought up on artificial feeding. The proportion reacting to tuberculin was not found to have been influenced by the manner of feeding during infancy. The weight of the infants was fairly normal, but the children over four years of age were deplorably short of weight when compared with others of their class. Children in cities, especially those who live with tuberculous parents, are at a great disadvantage, and infection is inevitable among them. Among the 692 children, 65 were found to be suffering

from active tuberculosis, of the bones and joints, glands or lungs. In 8 per cent. of the children, enlarged superficial thoracic veins were found. In children in whom a diagnosis of tuberculosis was made, 37.5 per cent. showed these enlarged veins and three-fourths were unilateral. Of the children showing signs of latent tuberculosis, 25 per cent. had enlarged thoracic veins. The cervical glands were swollen in 67.8 per cent. of the children; swollen glands in the axilla, groin, etc., were exceedingly rare. Only one child was found with enlarged supraclavicular glands, and it had other symptoms and signs of tuberculosis. Hyperplastic conditions of the nose, throat and pharynx, such as enlarged tonsils, adenoids, chronic rhinitis, etc., were found in 58.6 per cent. of the children. Scrofula was rather infrequent. These hyperplastic conditions, as well as scrofula, have nothing in common with tuberculosis. The external stigmata of tuberculosis, such as scrofuloderma, tuberculides, phlyctenula, glandular blepharitis and conjunctivitis, keratitis, etc., were exceedingly rare among these children. The cutaneous tuberculin test, applied twice and three times to those who reacted negative to the first application, was found positive in 7 per cent. of infants between one and six months of age. Between six months and one year of age 21 per cent. of the infants reacted positively. The percentage of positive reactions keeps on increasing with advancing age, and at fourteen years 83.79 per cent. were found infected with tuberculosis. When compared with the results obtained by others who reported the application of the tuberculin test to a large number of children, it appears that the tuberculous milieu has not materially increased the number infected with tuberculosis among the children over six years of age. The mortality of children under fourteen among these families was rather high. Among 188 under six that died, 30 succumbed to meningitis, *i.e.*, 16 per cent. of all deaths of children under this age were due to meningitis. The prognosis depends largely upon the age at which infection takes place. The danger as a fatal disease among children is in inverse ratio to the age at which they are infected. Those infected during the first two years, are liable to hematogenous tuberculosis, especially tuberculous meningitis. Children over five years of age when infected show only signs of latent tuberculosis and chronic phthisis is rather rare among them. Massive infection, such as is found among these children, is the most potent factor in the propagation of tuberculosis.

Nervous Diseases of Elementary School Children.—This study by J. Priestley (*Brit. Jour. Child. Dis.*, 1914, xi, 113) is based on the records of 62,236 children in elementary schools medically inspected from 1909 to 1911. There were 31,352 boys and 30,884 girls. In only two complaints, *viz.* chorea and headache, are more cases recorded against girls than against boys; and in chorea the predominance may depend on the predominance of rheumatism among girls. In functional disorders boys and girls are approximately equal; but in every other nerve complaint including all the serious ones, mental dulness and defect, stammering, paralysis, epilepsy there is a marked preponderance among boys. An explana-

tion of this unequal incidence of nervous disorders in boys and girls, as regards mental dulness at least, has been sought in the fact that the brain in girls ceases to grow in weight at about the age of seven, while in the case of boys it continues to grow until puberty. A still growing brain might be supposed to be more liable to derangement than one which has ceased growing. To put this to the proof we ought to contrast boys and girls at age five to six while the brain is still growing in both. In the statistics studied children are not classified for dulness or mental deficiency until they are about eight years old; but it is possible to contrast them in regard to all the other important nervous complaints. Headaches for obvious reasons should be left out of the calculation; it is difficult to judge of headaches at age five to six; but taking all other cases of nervous disorder together—stammering and defective articulation of speech, spasmodic and paralytic affections of childhood, epilepsy, chorea, functional disorders, and asthma—we find that 12,837 boys of five to six showed 601 cases of disorder, or 468 per 10,000, while 12,437 girls of five to six showed only 431 cases of the same disorders, or 346 per 10,000. Clearly the relative immunity of girls is not entirely, if at all, dependent on the earlier cessation of growth of the brain.

Congenital Pyloric Stenosis.—H. M. Richter (*Jour. A. M. A.*, 1914, lxii, 353) states that congenital hypertrophic stenosis of the pylorus presents the following condition:

A mechanical intestinal obstruction of a high grade, or possibly complete, the mechanism of which is such that life may be prolonged for weeks, but that usually results fatally in from six to ten weeks. In a certain proportion of the cases in which recovery occurs, evidence of incomplete obstruction persists for months or years. In the spasmodic type of pyloric obstruction, complete recovery usually follows persistent treatment, but the condition at times resists treatment for so long a time as materially to endanger the child's life by interfering with its nutrition. It is particularly important that the Röntgen ray, as a diagnostic measure, be limited to determining the rate of emptying the stomach, not the patency of the pylorus. To exclude a diagnosis of hypertrophic stenosis on the basis of the passage of bismuth is sure to lead to serious error. The writer presents a series of twenty-two cases with an operative mortality of 13.6 per cent. Of the twenty-two operations, nineteen were typical posterior gastro-enterostomies, with two deaths, a mortality of 10.5 per cent. Two of the deaths were clearly attributable to faulty technic. Of the nineteen patients who survived operation, one died of what was diagnosed as an acute food intoxication. Two of the seventeen cases had postoperative sequelæ, necessitating reopening the abdomen. None has shown any postoperative sequel in the form of hernia, recurring obstruction or any other evidence of mechanical harm from the operation.

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ORIGINAL COMMUNICATIONS

ANATOMICAL STUDY OF A VERY EARLY TUBAL PREGNANCY, WITH SPECIAL REFERENCE TO THE QUESTION OF DECIDUAL REACTION IN ECTOPIC GESTATION.*

BY

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(With thirty-one illustrations.)

AMONG the numerous studies published to date on the pathology of ectopic pregnancy, it will be sufficient to mention those of A. Martin, Abel, Kossman, and Werth. The most extensive and complete anatomical researches on the different questions involved in the ectopic imbedding of the human ovum are still embodied in the classical works of Webster and Ceuve-laire.

This last author has established the principles for subsequent studies requiring that researches be conducted on specimens of ectopics in evolution, and not on hematosalpinx of more or less old standing, or in others in which the mutual relations of ovum and tubal wall are completely destroyed by internal or external rupture of the embryonic sac.

Upon the basis of a study of more than fifty specimens of ectopic, with special attention devoted to implantation and formation of decidua in the tube, I feel safe in stating in advance that the earlier the age of the ovum, the more reliable the data, as compared with those offered by early uterine ova.

Of the long series of cases which I investigated in the Pathological

* A brief summary of this article and accompanying illustrations, were presented before the section of Obstetrics and Gynecology of the Academy of Medicine of New York, April 21, 1914.

Department of Cornell University, I found one worthy of careful and complete study, on account of its early age and the relative integrity of the component structures.

The rare occurrence of early, noninterrupted ectopic gestation is a fact fully appreciated by every one, who clinically at least, is well acquainted with the subject, and in fact, the most accurate study of the literature shows that if the early uterine ova are few, the early tubal are extremely rare.

In the first place the most common date for the interruption of the ectopic is generally admitted to be from the fifth to the seventh week. For the isthmic part, however, the investigations of Couvelaire have established that owing to the anatomy of this part of the tube the termination is more precocious.

In the second place, unless the accident is recognized with the initial attack, and the operation immediately performed, the chances of finding the relations of the structures still maintained are very few.

The only possibilities left for such occurrence are occasional findings of tubal pregnancies during operations performed for other indications, or *postmortem*.

In my case two fortunate circumstances contributed to the finding of a young ovum relatively well preserved implanted in the tube: (a) Seat of imbedding, isthmic part of left tube; (b) almost immediate operation after the first symptoms.

The more advanced cases, even if found in perfect state of evolution, could never give such evidence of the mutual relation between ovum and tube as the early ones, especially as far as the decidua is concerned.

Even excluding the usual delay interposed between the accident and the time of operation, the most possible factors of the altered relations and disappearance of the structures before the time of the accident, are the relatively poor trophic changes of tubal ova and the common intertuboovular extravasation of blood.

As a natural result of these causes and the difficult accommodation of the tubal wall to the irregularity in the increasing intratubal pressure, the tissues become necrotic, and the decidua is the most affected.

I will give now a summary of the case, which in the details substantiates the anatomical findings.

Mrs. C. M., thirty-one years old, Italian. Menstruated at fourteen years. Always regular—four to five days type.

No evident account of any infection previous or after marriage. Married four years before present illness. One child three years old. Normal labor and puerperium. Sterile since.

Periods always regular up to the fifteenth of January, 1912, which period lasted five days. No menstruation in February. On the seventeenth of February in the afternoon the patient was seized by severe abdominal and pelvic pain, with fainting spells, slight show of dark colored blood.

When I saw the patient she was practically in collapse and profoundly anemic.

Abdomen distended and tender. No masses could be felt in the pelvis. Uterus moderately enlarged and soft, external os impervious to the examining finger.

Patient had not seen any passage of membranes. Having made a positive diagnosis of ectopic, I operated upon the woman three hours after the beginning of symptoms.



FIG. 1.—Left tube and ovary. The tube was removed deeply into the horn of the uterus. The ovum occupies the isthmic section of the tube. Site of the rupture evident on the upper aspect of the tube.

At the operation a moderate quantity of free blood was found in the abdominal cavity. No clots. Uterus and adnexa were brought to view, and a careful inspection of the left adnexa revealed the presence of a continuous moderate oozing of blood from a slightly noticeable punctiform rupture in the upper side of the isthmic portion of the tube, quite close to the uterine end.

Left adnexa were removed. The patient made an uneventful recovery, and has had one child since.

Gross Specimen.—The specimen as represented in Fig. 1, minus a section which had been previously taken for examination, shows the

left tube and the ovary attached. The ovary, as it appears, is the seat of the corpus luteum of pregnancy.

The tube in the isthmus, quite close to the interstitial part, shows an almond-shaped enlargement, the longitudinal diameter of which is 15 mm. and the transverse at the center about 11 mm.

Almost in the middle of the upper side of the enlargement a punctiform rupture is seen.

Microscopical Findings.—I have made more than 300 sections of the entire ovular sac, and distal and proximal portions of the tube



FIG. 2, x 17.—Section taken at the site of the rupture. Blastocyst in the center; triangular in shape, surrounded by blood, trophoblastic masses and villi. Most of the villi sparse on the periphery close to the inner surface of the tubal wall.

outside of the sac. I failed to secure serial sections of the specimen, and probably on that account missed the embryonic area.

Blastocyst.—In many of the sections, specially the central ones, I have been able to trace a well preserved blastocyst. This is represented by a central cavity completely surrounded by a chorionic layer (Figs. 2, 3, 4, 5).

The dimensions of the blastocyst cannot be very easily determined. In some of the microscopical sections, looking with the naked eye and approximately measuring the empty space in the center, repre-

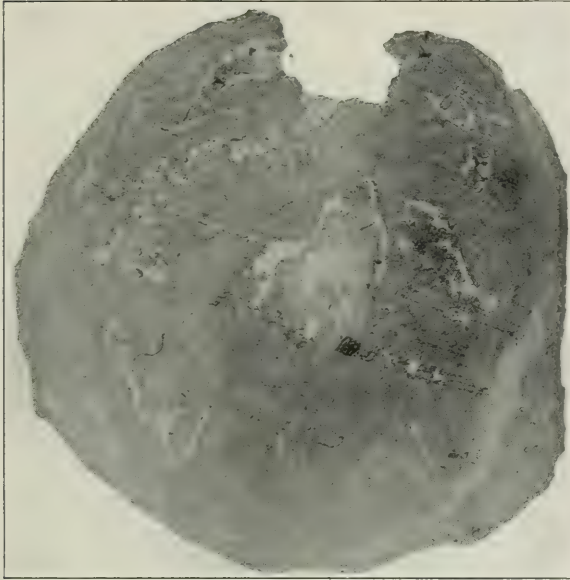


FIG. 3, x 16.—Blastocyst of identical shape of No. 2. Different arrangement of trophoblast at the base.



FIG. 4, x 16.—Blastocyst of quadrilateral shape. Cavity of blastocyst smaller. Villi attached in many points of the chorionic wall.

senting the cavity of the chorionic vesicle, the longest diameter varies from 3 to 4 mm.

This figure is better appreciated and determined from a magnification of the entire section which is sixteen to seventeen times the natural size. We must allow much more for the actual size when we take in consideration the collapse of the chorionic vesicle and the shrinkage induced in the tissue from the fixation fluid.

The chorionic vesicle assumes different shapes as can be seen from the accompanying illustrations (Figs. 2, 3, 4, 5), crowded in the center and thrown more or less into folds by the blood extravasation.

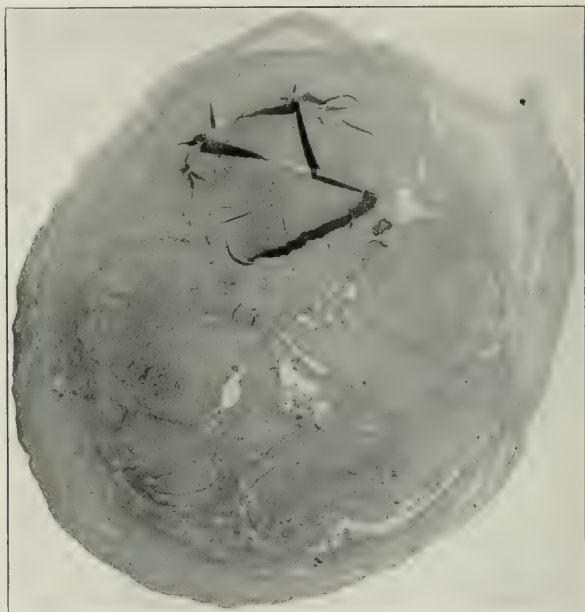


FIG. 5, $\times 16$.—Section taken at the proximal pole of the ovum. The blastocyst is surrounded almost entirely by blood and fibrin.

In any one of the sections, comprising the entire area, the details evidently show that the blastocyst has lost all the primitive connections and relative position of implantation.

The enormous amount of blood and fibrin surrounding the blastocyst, the very few villi closely connected with it, most of which are left spread out in the periphery attached to the maternal tissue, demonstrate the fact, that the specimen was secured when an internal abortion had occurred, possibly sometime previous to the operation.

The arrangement of the cells which compose the wall of the blasto-

cyst is well shown in Fig. 6. This wall is mainly made up of two layers of cells. In some parts, however, as many as six or seven layers of cells can be distinguished.

The differentiation of the cells is not possible everywhere, and a definite distinction is not easily detected except in a few spots of the wall of the chorionic vesicle, and only in some sections. Where such distinction is apparent, the cells of the internal layer are round or oval in shape, have very definite outline and show one or more, well-stained nuclei. The protoplasm stains very poorly, and that is

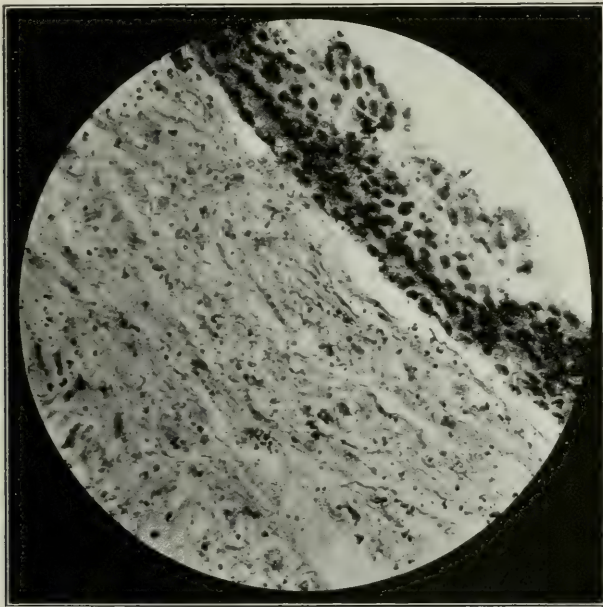


FIG. 6, $\times 450$.—Chorionic wall of the blastocyst. Mesoblast.

probably the reason why it is not easy to differentiate them from each other. These are the cytotrophoblastic or Langhans cells.

The elements constituting the external layer are made up of irregular masses of protoplasm with no contour and small nuclei. The protoplasm is granular and assumes a deep eosin stain. The nuclei generally flat, are darkly stained with the hematoxilin.

These are the plasmoditrophoblast or syncitium. Where the layers are multiple, they are entirely made up of syncitial masses, except the innermost one.

No vacuoles or spaces are discernible in the plasmodial elements.

At intervals a circumscribed point of the wall shows from the inner aspect a depression which has the appearance of an elongated cavity, ready for the reception of the mesoblast, actually developing the villi.

The cavity of the blastocyst in the central sections appears to be partly filled with mesoderm, arranged in a more or less thick layer, paving the inner side of the chorionic lamella, and leaving in the center a more or less wide and irregular empty space as is shown by sections 2, 3, 4 and 5.

In the polar sections where the pressure had been greatest, and more perhaps on account of the tangential way the sections were cut, the mesoderm completely filled the cavity.

In the above-mentioned depressions of the lamella forming the wall, the mesoderm sends occasionally indentation processes to fill the space, constituting villi.

Anatomically it is made up of a mucoid intercellular substance, in which spindle-shaped cells are diffusely scattered.

As I have previously stated, in none of the available sections, have I been able to find any definite embryonic area. If that is due to the failure to secure serial sections or to a pathological condition of the ovum, or faulty development on account of poor trophic exchanges, it is impossible to say.

Chorionic Structures.—Going now into the details of the structures surrounding the chorionic vesicle, in spite of the altered relations of fetal and maternal structures, many important features are worthy of description, which correspond with the data acquired through the study of other early ova.

Even with the collapse of the blastocyst and the large quantity of blood present, we may approximately judge from the disposition of the villi, arranged all along the periphery of the implantation cavity, that they probably surrounded all the chorionic vesicle and connected it to the maternal structure.

Couvellaire has found the same condition in his youngest tubal ovum of four weeks. The chorion at this time is villous in all its extensions. Early tubal ova are identical to early uterine ova-placenta everywhere in the periphery.

Here and there as is represented in Figs. 7 and 9, villi are closely connected and even intimately attached to the chorionic wall of the blastocyst.

A careful study of the changes of the chorionic wall and the immediate epiblastic formation gives with the attached illustrations

a perfect idea of the successive evolutions in the formation of the villi.

The proliferative activity of the trophoblastic elements is greater in some parts of the chorionic wall than in others. Solid buds of trophoblast and completely formed villi are closely surrounding it. These solid buds of cells, as in Fig. 8, are almost entirely made up of vacuolated plasmodial masses, among which are occasionally seen distinct round or oval cells lightly staining, with one or more nuclei.

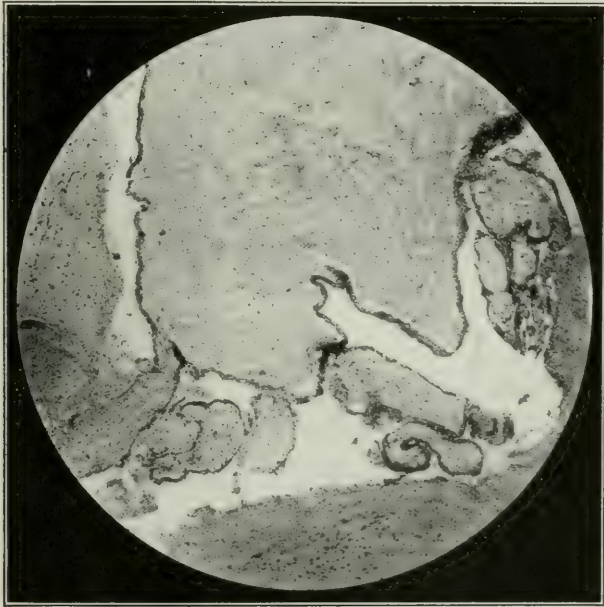


FIG. 7, x 75.—Villi attached to the blastocyst.

These buds, often isolated in many sections and independent from villi, are to be interpreted as remains of the primitive trophoblast or trophospongia of Hubrecht and generators of villi.

The mode of origin and formation of the villi, as described by Webster, is distinctly shown in my sections.

(A) In Fig. 7 we have one villus completely developed, made up of the epiblastic layer, including a mesoblastic but not entirely independent of its generator. The mesoblast is continuous with the mesoblast of the chorionic vesicle, as the trophoblastic layer is made of an extroflexion of the trophoblast of the blastocyst. In this

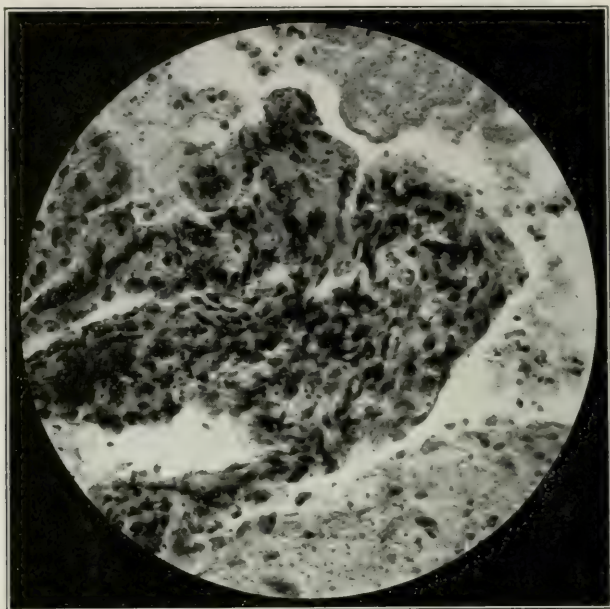


FIG. 8, x 450.—Plasmoditrophoblast masses, showing vacuolization.

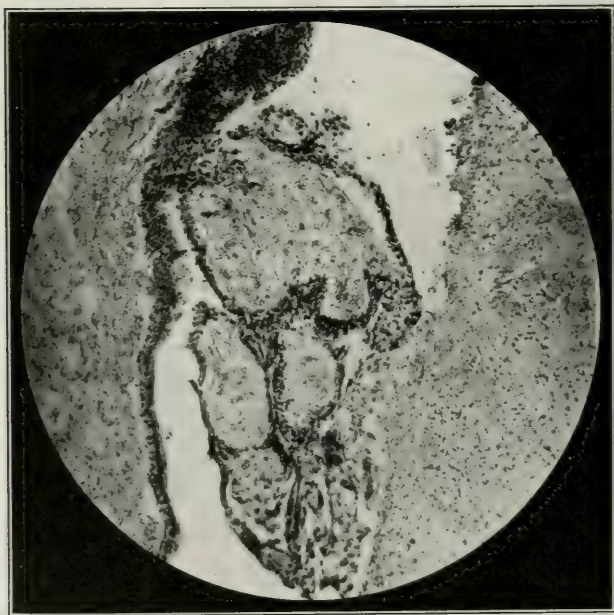


FIG. 9, x 200.—Chorionic wall of the blastocyst in proliferation. Villi attached.

instance the villus was undoubtedly formed through simple extension of the mesoblast in a depression of the wall of the blastocyst.

(B) In the same illustration on the opposite side, masses of syncytium with few Langhans cells are extending outward as projections, close to highly developed villi. Vacuolization, peripheral expansion of the plasmodial trophoblast, and consecutive extension of mesoblast inside are evident in these masses. This genesis of the villi from the proliferation of the trophoblast first, and then extension of the mesoblast in the forming vacuoles, is the fact most gen-

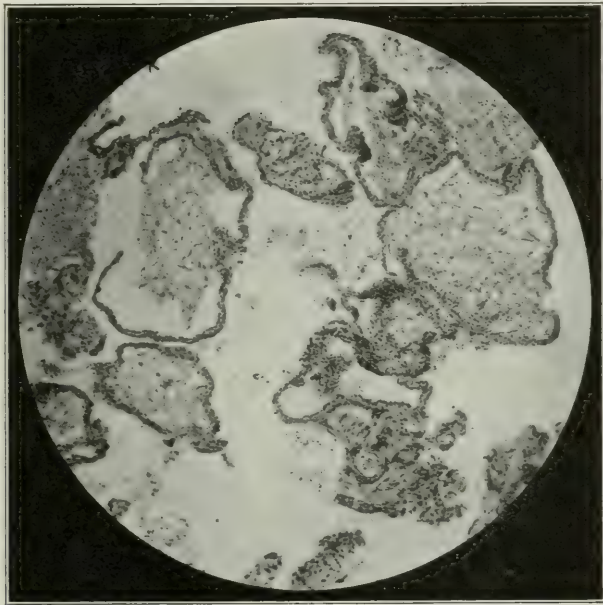


FIG. 10, x 60.—Masses and strands of plasmodium, villi in evolution.

erally accepted and is possible for all chorionic outgrowths, either connected with blastocyst or villi, or independent. Figs. 10, 11 and 12 clearly illustrate this point.

In the distinct network of plasmodial elements, mostly arranged in strands some of the spaces, within these strands, are incompletely filled with mesoblast, and some are completely filled with forming villi.

(C) Intermingled with the strands of syncytium is a solid group of Langhans cells (Fig. 12). Crowded out to the periphery and incompletely surrounding the central mass of cells, are plasmodial

elements, arranged as a continuous layer. Scarse mesoblast occupies the intercellular spaces.

From this finding, it seems probable that independent groups of cytotrophoblasts are apt to develop in complete villi, forming plasmodial elements from the cells crowded to the periphery, in which process of crowding out they find good support in the penetrating mesoblast.

Characters of the Villi.—The average size of the villi deduced from the magnifications of the microphotographs is from 1 to 2 mm. Most of them are round or club shaped. They are short, thick, few of them are long, but very few show any branches or attempt at



FIG. 11, X 175.—Plasmodial strands.

branching. The outer covering has the same histological appearance as the one described as forming the wall of the blastocyst. In some villi the distinction of the layers of the different trophoblastic cells is still clearer than in the wall of the blastocyst. The basal or internal layer, which in some villi is constituted by a few individual cells separated at various intervals, in many villi there is a true continuous and characteristic layer of cytotrophoblastic cells, with a comparatively distinct outline, showing one or two nuclei lightly

staining. The outermost covering of the villi is distinctly arranged in a single or double layer of irregularly shaped plasmodial masses with deeply staining nuclei, mostly flattened. Vacuoles are present, in the fine network of these plasmodial masses.

Buds or proliferating processes of the epiblastic covering of the villi, are frequently seen to grow from their surface, and consist almost exclusively of plasmoditrophoblast elements.



FIG. 12, $\times 330$.—Plasmodium and cytotrophoblast masses, apparently evolving into a villus.

The mesoblast of the villi is exactly similar to the one found in the blastocyst. It is a loose network of homogeneous tissue of embryonic type, in which are lightly scattered round or branched cells.

Vacuoles are found in the mesoblastic meshes. No trace of capillaries.

All the structures described, strands of plasmoditrophoblast or cytotrophoblast, villi in formation, completely formed villi, are irregularly and diffusely scattered in the blood and organized fibrin surrounding the chorionic vesicle, detached as they were from fetal and maternal connection by the internal abortion.

The same structures unequally distributed, but still maintaining

their anatomical relations with the underlying decidua are seen in the periphery of the implantation cavity, but the complete details will be later described, after giving an account of the ovular sac.

Gestation Sac.—This, as I have previously stated, is constituted by the isthmic section of the tube quite close to the interstitial. The changes in the peritoneal, subperitoneal and muscular coats of the sac are few and of little importance. The serous coat, partly covered by flattened epithelium, is in some parts deprived of epithelium.

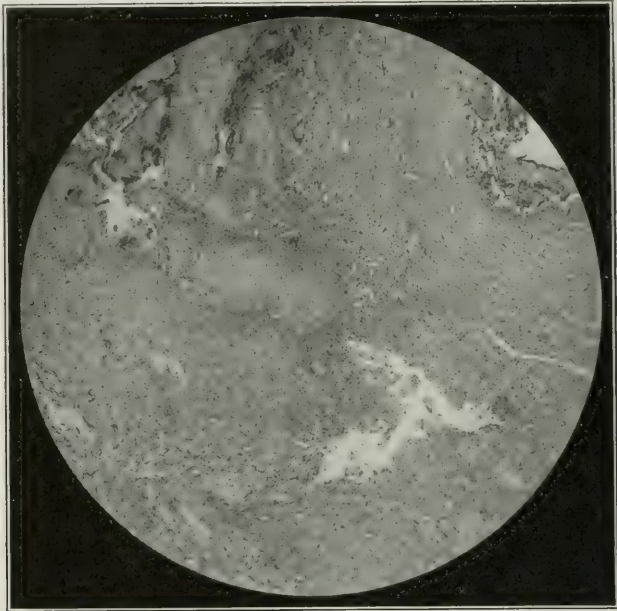


FIG. 13, x 60.—Tubal canal pushed to one side from the proximal pole of the ovum, breaking its way through the muscular layers of the tubal wall.

There is a moderate round cell infiltration of the subserous stratum, which in some areas shows marked edema. In no place does the peritoneum surrounding the sac show any decidua-like cells, or any epithelial invaginations. This stratum is amply provided with a conspicuous network of blood-vessels. The muscular coat presents a distinct division in two strata, the circular and the longitudinal in the sections outside the poles of the ovum, and to some extent at the poles of the ovum; but at the points where the pressure has been considerable, the entire wall is thinned out so as to leave in some spots no traces of muscular layers.

Decidua.—The most important modifications in the gestation sac are noted in the mucosa; I will give particular details of all, tracing them from the sections of the tube outside the proximal pole of the ovum to the sections outside the distal pole.

The proximal side of the tube outside the inner pole of the ovum, probably representing the interstitial part of the tube, shows, as can be seen in Fig. 14 the most remarkable changes of evolution of the mucosa to decidua.

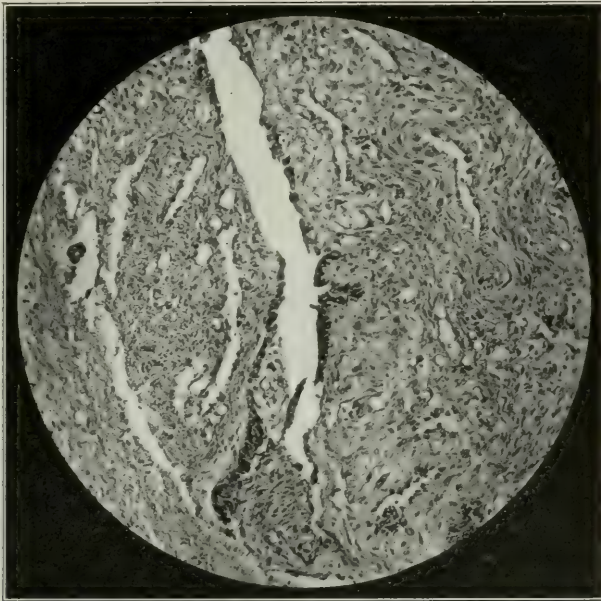


FIG. 14, $\times 200$.—Changes leading to decidual formation in the mucosa outside the proximal pole of the ovum. Flattening and partial disappearance of epithelium. Appearance of decidual cells in the stroma. Great abundance of blood vessels.

The epithelium is partly desquamated; where present, instead of being decidedly columnar, is beginning to assume a flattened shape. In the submucosa, few large round cells with clear protoplasm and nuclei are distinctly noticeable. It is of particular interest to note in the same sections, the glandular like invaginations of the epithelium, and the active proliferation of the endothelium of some blood sinuses in the submucosa stroma.

The next stage of evolution into decidua is well marked as we go further with the sections toward the ovum, and is distinctly seen in

Figs. 15 and 16, one from a drawing, the other from a microphotograph.

The lumen of the tube irregularly shaped and furnished on one side with a few short thick folds, is lined on this side with epithelium, which has assumed a flattened form and is partly desquamating. On the opposite side the mucosa is definitely transformed into a well-developed decidual layer.

The epithelium has entirely disappeared from the surface. The tissue representing the submucous stroma, increases in thickness,

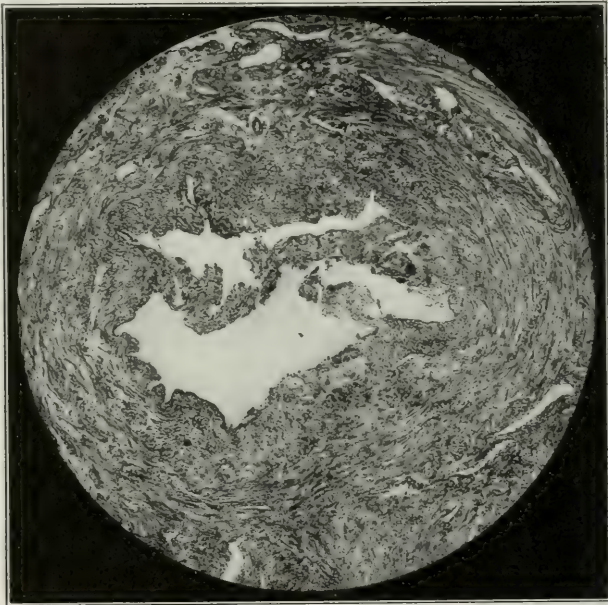


FIG. 15.—Photograph from a drawing. Tubal wall and lumen outside the inner pole of the ovum. The mucosa shows a distinct arrangement in columns of decidua in one side of the lumen. Large spaces at the bases of the columns. In the other side of the lumen the epithelium still present, is entirely flattened.

becomes uneven and bulging from the surface, arranges itself in columns, more or less regular at their edge, presenting at their base large spaces. We have in other words, all the appearances of a well-formed decidua.

The superficial layer, in which some of the columns show beginning degenerative changes, where it is better preserved reveals a marked proliferative activity and the presence of specific decidual cells. These, show almost always a more or less regular round or oval shape, clear protoplasm, and one or two, lightly staining nuclei.

They are diffusely scattered in the stroma, and more noticeable and conspicuous at the base of the columns. The stroma has a very loose appearance, and the cells are widely separated, never as close one to the other as in the uterus.

The spaces of the deep layer are evidently the effect of the fusion of the rising columns at their tops, leaving the bases far apart to constitute artificial cavities.

Going along to the pole of the ovum on the proximal side we find as in Fig. 13 that this occupies a space outside the circular muscular

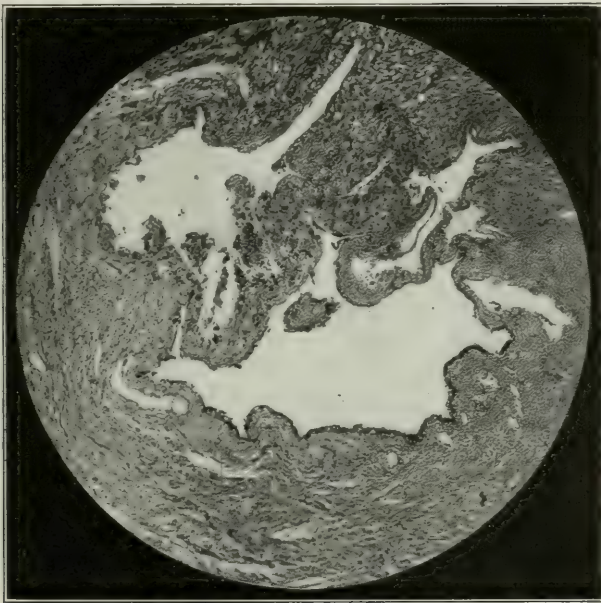


FIG. 16, x 60.—Same arrangement, but more distinct than in the preceding illustration.

layer. At this extreme limit of the implantation cavity, the ovum has not extended through the lumen, which is pushed to one side.

Surrounded by a distinct layer of decidua with the usual columnar disposition and very active, we find in the center organized fibrin and masses and strands of plasmoditrophoblast.

In the lumen the epithelium has completely disappeared (Figs. 17 and 18). Columns of decidua rise almost all around the cavity. The most superficial layer shows distinct coagulation necrosis. The marked invasion of plasmoditrophoblast strands sufficiently explains

the degenerative changes. These strands appear as hollow coverings of villi, infiltrate the spaces at the base of the columns, destroying the primitive connections between compact and spongy layers, and inducing degenerative changes in the superficial structures.

The histological study of the tube outside the external pole does not offer such evident changes as the proximal one. We notice first an hypertrophy of the entire wall mainly in the external layers, longitudinal muscular and connective.

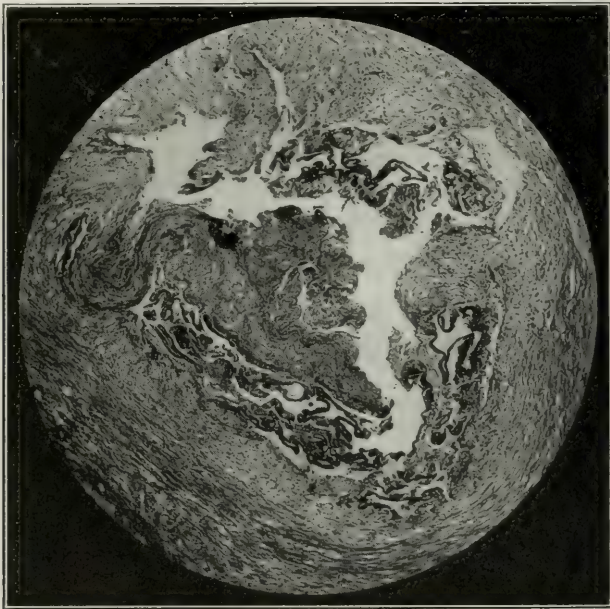


FIG. 17, x 60.—Necrotic changes in the superficial columns of the decidua induced by the action of the tremendous infiltration of plasmodial strands.

The tubal lumen at this point has an irregular star shape in the distal sections, and is provided with from seven to nine short thick simple folds; but going further with the sections toward the ovum, the shape of the canal becomes circular, and the folds gradually disappear, leaving only one at the extreme limit of the pole of the ovum. This fold excessively projecting from the surface dips its stroma more extensively than the surrounding ones.

The epithelium covering the folds and the rest of the lumen is not decidedly columnar; it is partly desquamating, partly proliferating, but can be traced up to the pole of the ovum. The changes in the

stroma, specially that part corresponding to the folds are of particular interest as is seen in Figs. 19 and 20. An abundance of round cells is distinctly noticeable. Some of these round cells are deeply stained, some show a clear protoplasm, and light staining nuclei. Identical but isolated cells intermingled with epithelial cells can be traced to the tip of the folds. The size of the clear cells varies extensively. All of them in fact should be considered as most probable stages of decidual cells.

In fact I will say, that if distinct decidual changes are not evident outside of the ovum in the distal part of the tube, as in the proximal,

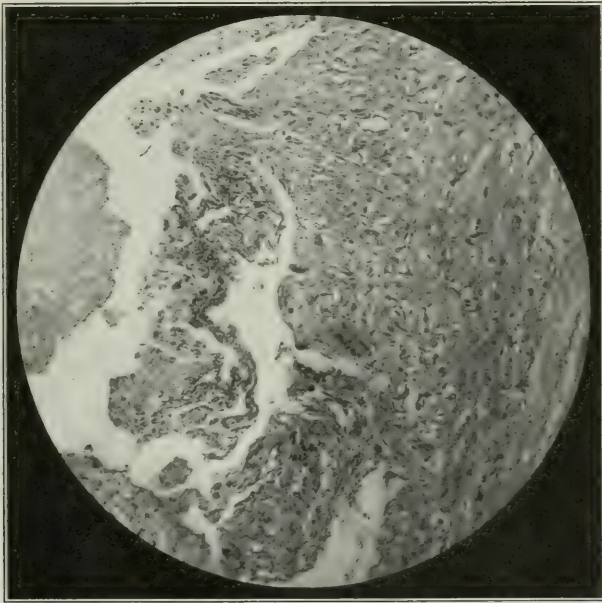


FIG. 18, $\times 140$.—Well-preserved decidua. Plasmodial strands upon its surface.

a clear attempt at preliminary modifications toward that form is certainly noticeable.

The actual pole of the ovum, however, in the distal end evidently shows changes as marked as in the proximal pole. The lumen of the tube, as appears from Fig. 21, is occupied by a structure which has all the characteristics of a well preserved decidua in its periphery probably representing nothing else but the rising of the only fold left and previously described, magnified by the incident decidual transformation at the site of nidation of the ovum.

As we proceed with the sections, the lumen of the tube and the circular muscular layer disappear to give place entirely to the distal pole of the ovum, implanted upon columnar projections of the tubal wall at the section corresponding to the mesosalpinx.

The details offered by the sections at this point are undoubtedly suggestive of being at the site of nidation of the ovum; and notwithstanding the partial alterations induced by the blood extravasation, the topography and relations of fetal and maternal tissue in an early

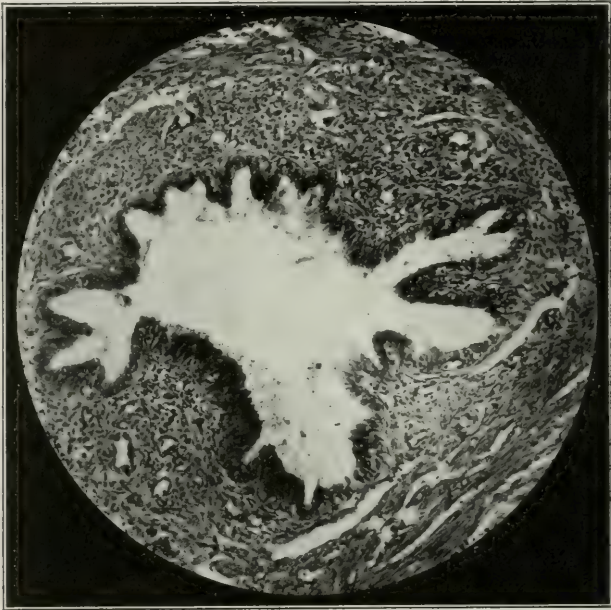


FIG. 19, x 200.—Slight changes in the mucosa of the tube outside of the distal pole of the ovum. Increase of the round cells of the stroma. Partial desquamation of epithelium.

tubal pregnancy, I believe could hardly be found better maintained than in the present specimen.

A simple glance at the entire section as reproduced in Fig. 22, shows a marked distinction in the layers of maternal tissue, which come in contact with the fetal.

What should be considered as the serotina from the evident most intimate relations with the greatest bulk of fetal structures, is represented on the inferior segment of the tubal wall by tissue arranged in short, broad columns, and more or less projecting from

their bases. They are four or five in number in the different sections (Figs. 23, 24, 25 and 26).

From the extreme limit of this projecting columnar arrangement, as is mostly evident on the left side of the section and is better evidenced in the next illustration (Figs. 27 and 28), a fold arises as a capsularis or reflexa to surround the ovum, leaving a distinct space between itself and the inner aspect of the tubal wall upon which the decidua vera lies. On the right side, the excessive pressure from blood extravasation has destroyed the insertion of the capsularis,

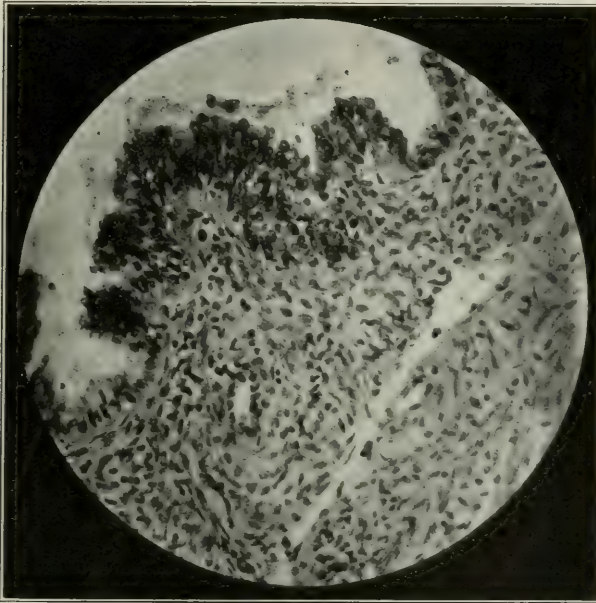


FIG. 20, $\times 400$.—Fold of the tubal mucosa outside the distal pole of the ovum, showing epithelial changes. In the stroma abundance of round cells, slightly staining, probable forerunners of decidual cells.

and the end only is scarcely noticeable, adherent to the vera on the tubal wall.

(A) *Serotina and its Relations*.—It is easily divided in two distinct sections, the superficial compact, and a deeper spongy layer, at the base of the columns. The distinction is not to be compared with the one in the uterus. This appearance is only given at this point by the presence of large sinuses in the deeper layer. No gland-like structures are present and there is no epithelium on the surface of the columns. A thin lamella of fibrin, darkly stained with eosin

covers the columns, and the reflexa and vera. This Nitabush layer has to be differentiated from the larger diffuse areas of necrotic decidua, irregularly scattered in the serotina, but specially following the line of invasion of plasmodial masses, although the etiology is probably the same.

As constituents of the serotina we have the characteristic large round or oval, clearly staining uni- or polinucleated cells irregularly scattered throughout the tissue. They are perfectly distinct from the intercellular substance, which is rather homogeneous, faintly

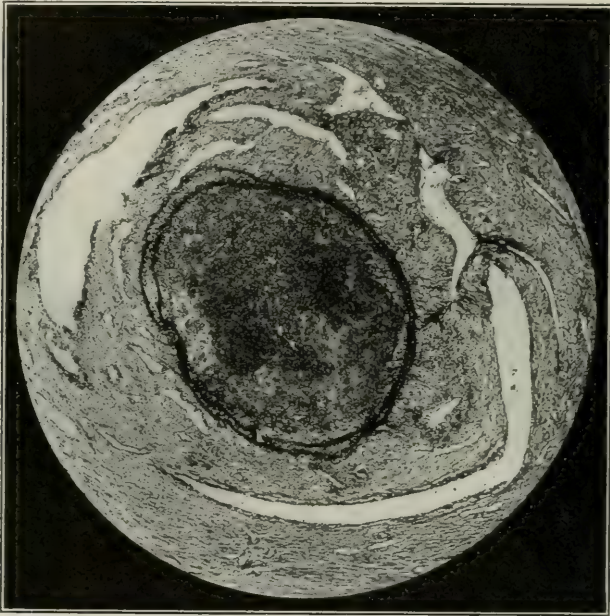


FIG. 21, $\times 75$.—Decidual formation at the pole of the ovum; necrotic in the center, shows in the periphery distinct decidual characters. It is connected by bands to the tubal lumen, which is still lined with epithelium.

fibrillar, but has a lacunar appearance, in which lacunæ the specific cells are situated.

Marked round cell infiltration of the stroma. Marked enlargement of blood-vessels; slight proliferation of the endothelium.

The plasmodium is closely connected with the surface, in some parts it traverses in masses the entire thickness of the columns, and occasionally diffuses into the intercellular substance.

Entire tracts of the surface are covered by the plasmodium, and are intimately connected with the same (Fig. 29).

In Fig. 30, is clearly illustrated the process of invasion of the decidua and blood-vessels by masses of trophoblast. Where the decidua is in direct contact with the traversing plasmodium, it shows marked degenerative changes. At the base of the columns there is an apparent breaking through a sinus by the plasmodium, with consecutive direct contact with the contained blood.

In the details of the same illustration (Fig. 31) it is perfectly possible to follow the process of vacuolization in the plasmodial masses,

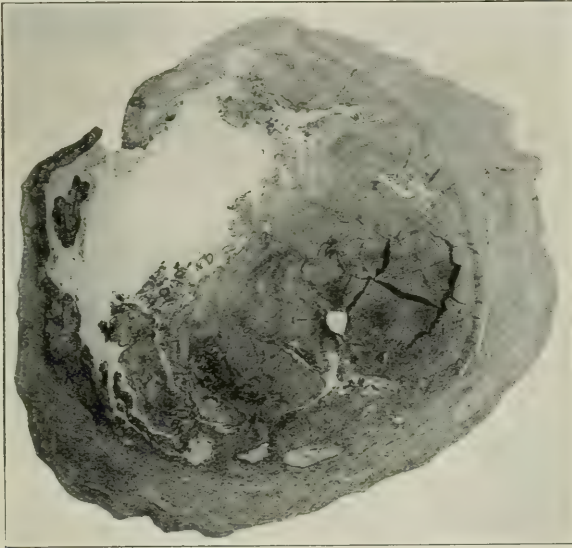


FIG. 22, x 14.—Entire section of the tube at the distal pole of the ovum.

Note.—At the base of decidua, apparently the serotina, surges to surround the ovum as capsularis from the left edge of this fold. On the right side of the illustration such distinction is impossible on account of the blood and fibrin.

consecutive formation of a spongy network, in which meshes the blood rushes from the broken up capillaries of the decidua. It is of great interest to note that at this stage of development the relation of maternal tissue as serotina and formed villi is very occasional and not intimate, and the trophic changes are entirely brought on by the plasmodium, which by invasion of the decidua and blood-vessels brings the blood in the intervillous spaces.

(B) *Capsularis or Reflexa*.—This, as seen from Figs. 27 and 28, represents an incomplete attempt at encapsulation of the ovum. In this it succeeds to a certain extent, and were it not for the changes due to the increase in the intracapsular pressure by the growth of

the ovum, and more specially those due to the impending abortion, the attempt would probably appear more perfect.

In fact, in the immediate successive sections, where the pressure has tremendously increased, with no space left in the lumen of the tube, and the blastocyst present with the accompanying fetal structure, it is on the point of being expelled near the break in the tubal wall, all evidence of differentiation of decidua reflexa and vera is obliterated. Aside from this, even where such effort at formation of reflexa is most evident on one side, on the opposite side, however,

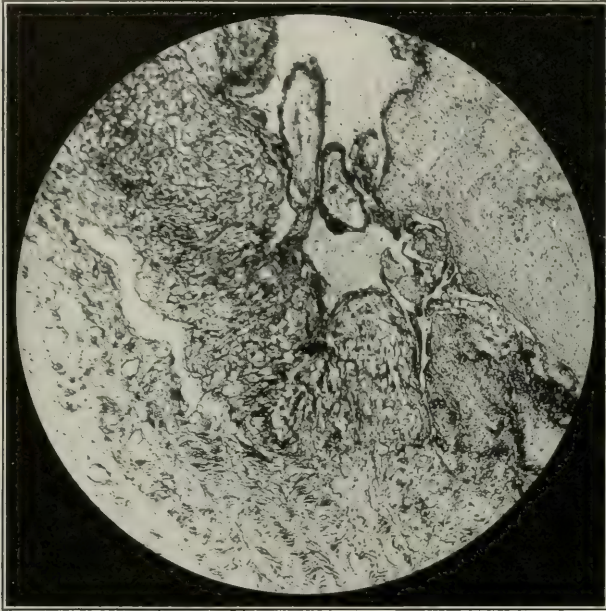


FIG. 23, x 100.—Decidual columns of the supposed serotina. Plasmodium covers the surface of the columns and breaks its way through them. It is only occasionally, as in this instance, that villi are close to the surface of the decidua, through buds of plasmodial proliferation.

it is not so distinct, and the reflexa is pushed against the vera by the large blood clot.

As to structure, it is identical with the superficial layer of the serotina. It is provided with less number of decidual cells, and abounds in intercellular tissue with little vascularity. This, and the pressure from the inside structures, sufficiently explain the considerable degenerative changes. The plasmodium is intimately adherent to the inner surface.

The manner in which the fold springs from the serotina, the space between the outer aspect of the fold, and the inner aspect of the remaining tubal wall modified into vera, and their identical structural characters are rather suggestive of this, as being a capsularis or reflexa.

(C) *Vera*.—The vera slightly uneven and various in thickness rests on the tubal muscular layer with no evidence of epithelium on the surface. Here and there a few plasmodial masses can be seen

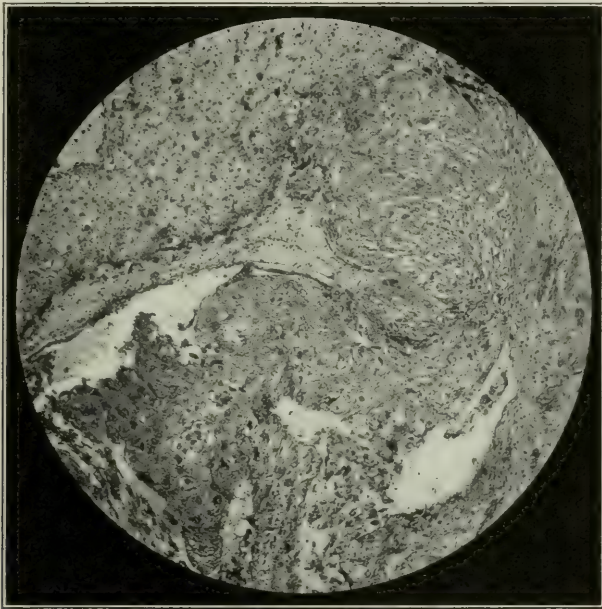


FIG. 24, x 130.—High magnification of the serotina. The constituents are more clearly illustrated than in the preceding Fig. 23.

with a slight tendency at invasion and no evidence of breaking up of the decidua or vessels.

Cells and intercellular substance do not show marked degeneration. There is moderate round cell infiltration.

The most striking feature is the abundance of capillaries and sinuses at the junction of this decidual layer and the subjacent tissue. In some of these vessels, there is a proliferation of endothelium, and no invasion of fetal elements.

Site of Rupture.—Judging from the situation of the supposed serotina on the section of the tube corresponding to the mesosalpinx, the rupture has occurred on the opposite side. What macroscopically

appears as a cribiform structure, microscopically is represented by an active invasion of the tubal wall by villi. The position of the wall of the tube at the site of rupture is thinned out and reduced to a connective lamella traversed by masses of fibrin, in which are entangled villi, some preserved, some degenerated. The edge of each of these small openings is constituted only by the peritoneoconnectival layer on the inner aspect of which are still present in spots groups of decidual cells in a thin layer of evidently necrotic decidua.

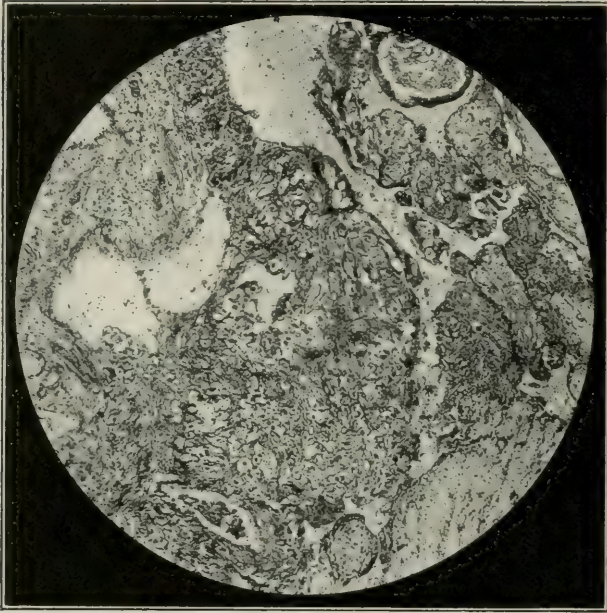


FIG. 25, $\times 100$.—Extreme limit of the serotina on the left. Marked distinction of a superficial or compact layer, and a deeper or spongy one. Large sinuses are responsible for this last appearance.

CONSIDERATIONS.

Having presented a description of the case, studied from both the clinical and anatomical side as completely as possible, I desire to conclude with a few considerations, to explain some of the reported data.

The age of the ovum is a problem of great importance in this case. In spite of all the clinical knowledge acquired on the human subject, and through continuous and careful researches in comparative embryology, we possess no secure criteria to estimate the exact age

of the different ova. Our inability to give positive opinions on this question is undoubtedly due to the unsettled relation of menstruation, ovulation and fertilization.

The old theory of Pflüger in considering menstruation, as an immediate effect of ovulation, and the method of calculating the beginning of pregnancy from the date of the last menstruation, was somewhat shaken by the clinical studies of Prochownick and de Sinety, and later by those of Leopold and Ravano. The last authors, from a careful clinical and anatomical study of ninety-five ovaries removed

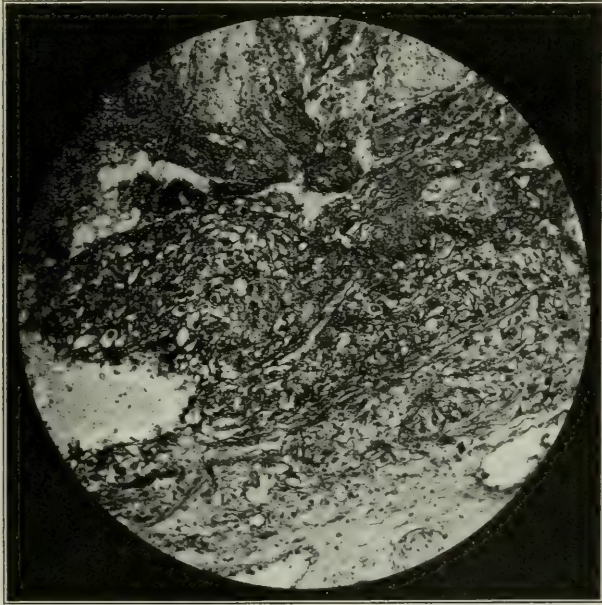


FIG. 26, x 150.—Higher magnification of Fig. 25.

at operations, showing in only fifty-nine (62 per cent.) a synchronism in the two processes, concluded that if in the majority of cases such relation exists, it is, however, often missing, and therefore ovulation and consequently conception may occur at any time.

Even accepting with Teacher and Bryce for the human subject the theory of Heape and Marshall on the œstrum of the lower mammals in interpreting the menstrual cycle, not as far as anatomical changes are concerned, but only as to its bearing on the sexual processes of ovulation and fertilization, we are forced, from the clinical evidences, to recognize the fact that in man the probabilities of conception are

extended with no limitations beyond the boundary of a possible conventional œstrum, corresponding to the postmenstrual period in which the desire is greater.

Teacher and Bryce, fully discussing this side of the question in their "Contribution to the Study of Early Development of Human Ovum," regard coitus as a factor of great importance in determining the age of the ovum when it has occurred only once in the history. Evidently we must accept their contention as the most reliable, but



FIG. 27, x 60.—Reflexa or capsularis, springing as a fold from the extreme left of the serotina. Space between capsularis and vera; this last appears various in thickness on the inner aspect of the remaining constituents of the tubal wall.

even this factor is subject to certain limitations and consequently of relative bearing.

In the first place it is easy to understand the difficulty in securing reliable data on the history of coitus, and how, only through fortuitous circumstances, as in the case of Eternod and the one of Teacher and Bryce, it was possible to do so.

In the second place, we must consider the fact that even in such cases the data may be faulty, if we only think of the possible variations in the travelling of spermatozoon and ovum, of their meeting place, and capacity of living before they meet. In the present state

of knowledge we are not certain of the time the spermatozoon may remain alive in the genital tract and capable of fertilizing before the occurrence of conception. The allowance of twenty-four hours, according to Teacher and Bryce, for fertilization after menstruation, when this last coincides with the discharge of the ovum, is only an assumption, and as such of only relative importance in deciding the age of the ovum.

In view of the uncertainty and consequent insufficiency of the discussed data to establish the correct age of pregnancy, we should

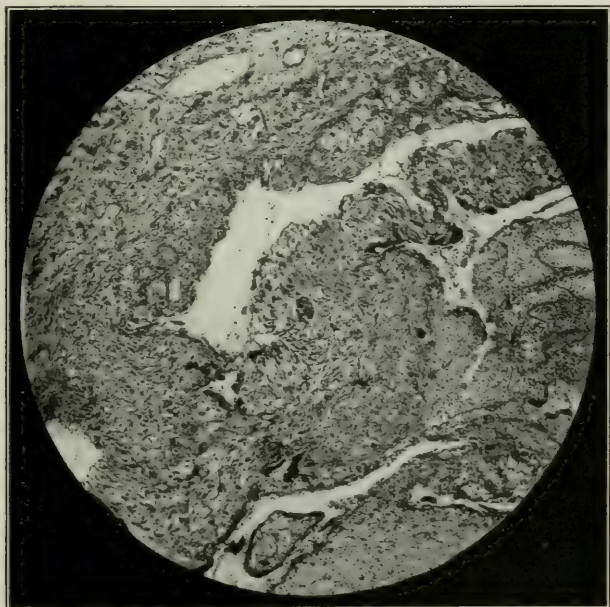


FIG. 28, $\times 100$.—The differentiation of Fig. 27 is shown more distinctly.

rely on the anatomical evidences to secure the best available information. But in spite of the ample knowledge acquired through the direct study of various young human ova, since Peters opened the series of such investigations, we may say that at present the details connected with the first stage of development are still incomplete. Considerable light has been lately brought on the subject by the extensive and comparative study of Teacher and Bryce.

Undoubtedly they have thrown much light on the subject, added new important features and strengthened the chain of anatomical evidence of early human development. They have given very

valuable information on the imbedding of the ovum, and what is of much greater interest, they have made clear the way in which the primary relations are established between ovum and maternal tissue, through the trophospongia, which is similar to that described by Hubrecht for the tarsius. This analogy had been, however, anticipated by Webster in his work on human placentation. They have, besides, endeavored to fix with a most elaborate comparative study, the correct age of the early ova described. On the basis of their findings the ovum of Peters, estimated always to be a few days old, was then considered as thirteen and a half or fourteen and a half days.

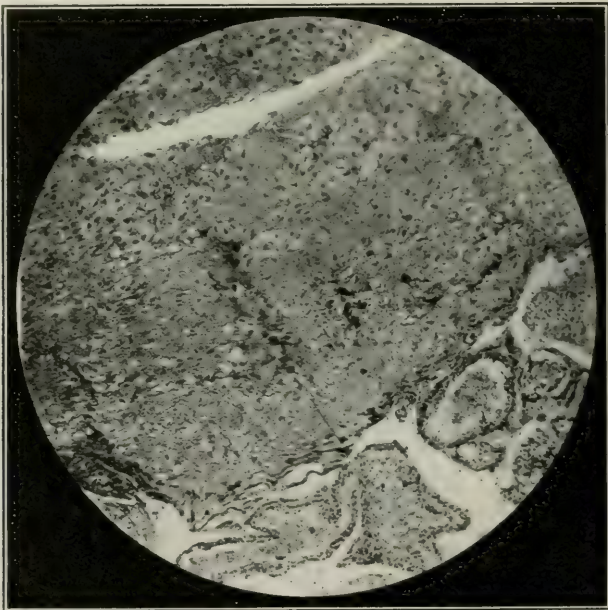


FIG. 29, x 60.—Close relations of plasmodium and decidua.

Strong points of differentiation, according to Teacher and Bryce, are furnished apart from the embryo, which may be absent, as in some of the specimens studied, by variation in the features of the primitive trophoblastic formations by the state of the blastocyst and characters of the mesoblast.

In comparing the three supposed youngest ova, the one of Peters, the one of Leopold and their own on the basis of their findings (undifferentiated condition of the chorion of the blastocyst, absence of a cellular layer in the trophoblastic process, absence of arrangement

of the thin mesoblast in a denser layer around the chorionic wall, and absence of indentations of the wall), they tabulate them as follows: Teacher and Bryce, the youngest, Leopold next, and Peters the oldest. In fact, the last is characterized by a more distinct state of differentiation in the two varieties of cells, either in the blastocyst or in the trophoblastic buds, by some outgrowth of mesoblast in the trophoblastic depressions, and a more definite intermingling of fetal elements and decidua.

But due consideration must be given to the variations of development or to some pathologic conditions of the ova studied. This

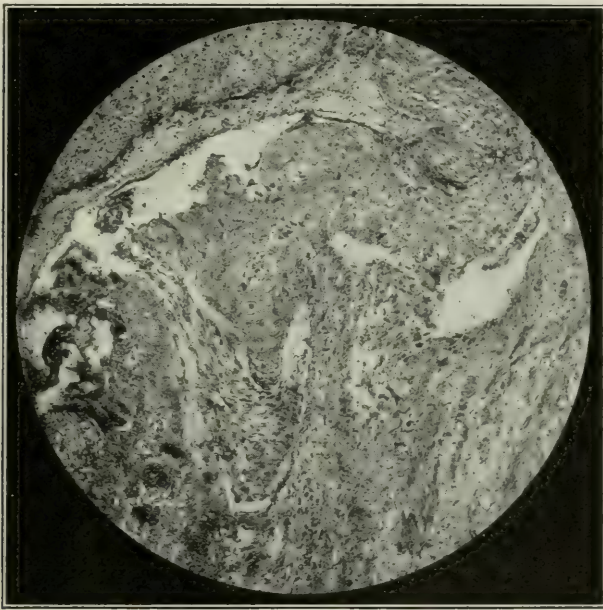


FIG. 30, x 100.—Plasmodial masses and cytotrophoblast breaking through decidua and sinuses.

fact, well appreciated by Teacher and Bryce, was long anticipated in the statement of Webster in his study on human placentation, that early ova are subject to considerable variations in regard to the rate of growth, shape, appearance and rapidity of development of villi. Therefore, we must conclude that, until many careful observations of early normal specimens have fixed the anatomical data relative to the different stages of evolution, we shall not have a positive rule by which to estimate the exact age of the ovum. In an early tubal ovum, as the one described, the above mentioned diffi-

culties are accentuated by the fact that the tube is an improper ground for the development of the ovum. Disturbances in the normal evolution and pathological conditions are rather liable to occur, thus altering the normal features. For instance, absence of the embryo in the tube should be considered as a frequent occurrence, so that this very same absence in my case, instead of being due to the failure to secure serial sections, was probably due to trophic disturbances. This assumption is borne out by the relative disproportion between the blastocystic formation and evolution of villi.

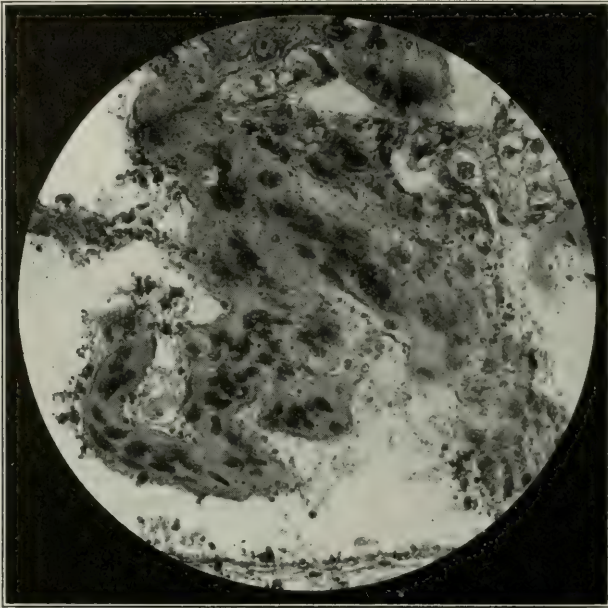


FIG. 31, x 475.—Plasmoidal masses on the surface of the decidua vacuoles in which rushes the extravasated blood.

It is a well-known fact, on the other hand, that normal development of villi is possible in the absence of the embryo, and consequently with interruption in the growth of the blastocyst.

In view of all these evidences the only reliable factor for the determination of the age of this ovum is practically the date of the last menstruation. In this regard, Dr. J. Whitridge Williams, to whom I submitted microscopical slides of the specimen writes: "There is no doubt that you had to deal with a very early tubal pregnancy, and that the structure in the center of the specimen represents the blastocyst. Further than this I should not be willing

to say on account of the absence of the embryonic area. I think, however, in view of the history of the case, that you are safe in saying that the pregnancy is not older than three weeks.”

The history further allowing at least a week after the last period, supports this contention, more than all the recorded anatomical features, by the relation of fetal and maternal structures. These in fact consist only of lightly intermingling plasmodial masses and decidual columns; at no point does any villus break into the decidual columns.

The size and broken connections of the ovum and implantation site are responsible for the loss of all evidences of the manner of imbedding, and the site of imbedding can only be approximately estimated.

On the contrary, we have enough definite features regarding the formation of the decidua to convince us that there is no reason to believe that this process is any different in the tube from that in the uterus. Undoubtedly we have to allow for some variation on account of the anatomical peculiarities of each of the two mucous membranes.

Absence of glands in the tube could easily explain the absence of a definite spongy layer; but even in this respect, as we have seen, Nature attempts almost an identical process although infrequently, for the inclusion at intervals in the proliferating stroma evolving to decidua of cavities lined by epithelium, representing the fundus of the tubal folds.

Prevalence of the intercellular fibers in the stroma of the tubal mucosa accounts for the sparsely grouped cellular appearance of the tubal decidua, varying from the uterine, in which the cells are closely packed.

After a careful analysis of the reported cases, I feel safe in stating that none of them show such remarkable arrangement of decidua extending continuously from one pole to the other, only thinned out in the equatorial zone of the ovum at the points of greatest pressure.

The details as above described with the illustrations as given, should be sufficient to dispense with further remark. But the importance of the question, and the doubt cast upon it by many observers, as Couvelaire, Bandler, are sufficient to justify any explanation of the data found.

The most typical changes, leading to the production of decidua, are clearly shown in the sections of the tube outside of the pole of the ovum.

Disappearance of the epithelium, increase in number and modifica-

tion of the round cells of the stroma, gradually developing into specific decidual elements, typical arrangement in columns or round elevations of the modified stroma, abundant network of blood-vessels and sinuses, all these represent an acutal evolution of the tubal mucosa to a decidua vera.

When we consider that these features are supplemented by a definite attempt to differentiate the decidua into serotina, reflexa and vera, as described and illustrated at certain points, we must conclude that the process of decidual formation is identical, with slight variations, in the uterus and in the tube.

It is logical to assume that the receptivity for imbedding the ovum in tube and uterus is identical. That is, the response of the tissues to the same stimulus must be teleologically consonant. In other words, if the decidua plays an important rôle in the early process of pregnancy, there is no doubt that a similar formation is essential wherever there is a possibility for pregnancy.

This mode of interpreting the formation of decidua as a necessary effect of pregnancy is evidently at variance with the theory of Webster, which attributes to the uterine mucosa in man the normal faculty of forming decidua, and only as a result of faulty development it is occasioned to the tube and a cause of ectopic. But this specificity accorded to the Müllerian tissue, and its interpretation as the etiologic factor of ectopic have been discredited by the undisputed findings of ovarian pregnancy and decidual formations in other organs (appendix, peritoneum) during pregnancy. On the other hand, we are forced to discard on the basis of the advocated theory, the belief that the decidua menstrualis is a possible monthly preparation for the reception of a fecundated ovum. Great support to this contention is found in the fact that anatomical differences exist between the process of decidua menstrualis and the earliest decidua of pregnancy. One is attended by partial disintegration and consecutive regeneration, the other, as far as we know, from its inception, is entirely a formative process. Even recognizing with Adler and Hitschmann that during the congested premenstrual swelling, endometrium closely approaches that of an early decidua, the well-known fact that the greatest number of pregnancies are estimated to occur after the last period, makes the two processes entirely distinct.

Taking now into consideration the formation of the reflexa, the tube, as Webster has pointed out is not as apt as the uterus to cause its development.

According to the latest accepted idea on the imbedding of the ovum in the uterus, suggested by the important investigations of Hubrecht

on the hedgehog, Graf. v. Spee on the guinea-pig, Peters first and Teacher and Bryce most recently on the human subject, the reflexa or capsularis of His is constituted by the blending of the lips of the growing decidua at the extremities of the depression in the stroma, formed by the ovum eating its way through the modified mucosa deprived of epithelium (serotina). Given the size of the uterine cavity plenty of space is left between this decidua arising and surrounding the ovum, and the modified mucous membrane lining the rest of the cavity (decidua vera).

The fusion of the capsularis with the vera, and consequent disappearance of the intermediate space, is only a later occurrence. In the tube, on account of the small size of the canal, immediately after the implantation, or shortly after, the ovum occupies the entire cavity, offering little or no chances at differentiation; and the reflexa is rapidly crowded against the vera, becoming fused with it or necrotic. Notwithstanding this unfavorable condition for its development found in the tube, the reflexa has been reported to be apparently well formed as in the specimen mentioned by Webster.

In my specimen many sections on the outside pole of the ovum suggest an attempt at formation of the reflexa. Absence of epithelium on the outside aspect of this structure would be a reasonable objection against considering it as such; but in this specimen, even on the section outside the ovum wherever there is considerable evolution of the mucosa to decidua, the epithelium has disappeared.

I deem it necessary to emphasize the fact, that at this rather early stage the relation of fetal and maternal elements is almost exclusively and sufficiently established by an intermingling of the plasmodial elements within the decidual columns. The Langhans cells are comparatively few and rather grouped with the plasmodium which seems to play mainly the rôle of breaking through the decidua and decidual sinuses to secure the trophic changes for the ovum.

No villi are deeply situated, but only seem to be close to the tips of the decidual columns, or attached to them by bands of proliferating cytotrophoblastic elements.

In a more advanced stage of tubal pregnancy, at the fifth week, the relations are almost the opposite. Extensive proliferations of the cellular buds are extending through the decidual columns, paving the way to the villi, breaking through the decidua and the sinuses.

Even where the Langhans cells are most diffused, their smaller size and better affinity for the stain are sufficient to differentiate them from the characteristic decidual cells.

I wish to extend now my sincerest appreciation for the suggestions

and encouragement afforded me by Dr. Ewing, Director of the Pathological Department of Cornell University, to Dr. Stockard, Professor of Anatomy at Cornell University, to Dr. J. Whitridge Williams, of Johns Hopkins University, for the interpretation of some of the sections, and to Mr. Dunn, of the Loomis Laboratory, for his microphotographic work.

348 EAST ONE HUNDRED AND SIXTEENTH STREET.

PITUITARY EXTRACT IN OBSTETRICS.

BY

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SINCE the introduction of the antiseptic method in obstetrics by Semelweiss and Oliver Wendell Holmes in the early forties, nothing has had such a far-reaching effect on the practice of midwifery as the use of pituitary extract.

Numerous reports from lying-in hospitals have appeared in the European medical journals recounting various experiences with this preparation. Recently a number of papers appeared in the American medical press, all urging the greatest caution and sounding warnings against its use. The writer has had exceptional opportunity to observe the use of pituitary extract at the Royal Imperial University Hospital (Prof. Wertheim), Vienna, at the Jewish Maternity and at the Sydenham Hospital, New York, and in private practice, and it is the purpose of this paper to record his experience with the use of this drug and to point out its indications in obstetrics. However, for a better appreciation of the properties of this remarkable preparation, it is not amiss, before entering upon a discussion of his observations to introduce an historical résumé, including a short anatomical description of the pituitary body.

Anatomy of the Pituitary Body (Glandula pituitoris Hypophysis cerebri).—Vesalius, the famous anatomist, was the first to describe the pituitary body in 1553. This gland is situated at the base of the brain in the depression of the sphenoid bone known as the sella turcica. It is a small rounded body, on the average not more than half a gram in weight, and consists of two distinct parts, an anterior and a posterior lobe. The posterior lobe is smaller, is grayish in color, and is an outgrowth from the third ventricle of the brain. It has no glandular structure, but consists of glia and nerve cells.

The anterior lobe is larger, reddish in color, and is derived from the primitive pharynx. At a certain period in embryologic development it appears as a pouch, which is empty at first, but subsequently becomes solid by the development of epithelial cells. Two groups of cells can be distinguished, the chromophobes, "Hauptzellen," (chief cells or pregnancy cells) and the chromophiles. The former take stains poorly, but the latter have a strong affinity for dyes. The chromophile cells are of two kinds, one variety stains with acid and the other with basic dyes. Between the anterior and posterior lobes is the pars intermedia, which consists of slightly granular cells arranged in islets. According to Hering, a colloid substance is formed there which passes into the posterior lobe, there to be activated and then passed into the infundibulum, and thence into the cerebrospinal fluid.

Change of the Pituitary Gland during Pregnancy.—During pregnancy, the pituitary gland becomes enlarged, reaching at the end of pregnancy almost double its original size. After pregnancy, involution takes place, but the gland never again returns to its original size. The increase is due to hypertrophy and hyperplasia of the "chief cells," which now become transformed into what are known as "pregnancy cells." They become large, granular, begin to stain well with eosin, and show a large light nucleus. They encroach upon the eosinophile cells, which shrivel up, but they do not affect the basophile elements.

Erdhein and Stumme have shown that associated with the changes in the hypophysis during pregnancy, changes occur in the soft parts and in the bony structure, simulating early cases of acromegaly.

Relation of the Hypophysis to Other Diseases.—Until recently the pituitary body was considered a rudimentary organ or an evolutionary vestige, but in 1886 Marie pointed out that the disease acromegaly was accompanied by lesions of the hypophysis. Later, in 1898, Hochenegg was able to cure a patient with typical acromegaly by removing the tumor involving the hypophysis.

Rogowitsch showed that extirpation of the thyroid was accompanied by hypertrophy of the hypophysis, concluding therefore that it acts vicariously for the thyroid gland. Launois and Roy pointed out that gigantism is associated with disease of the anterior lobe of the hypophysis, and also accompanied by marked atrophy of the sexual organs. In the acromegalic type of gigantism, hyperfunction is presumed to be the primary cause of the abnormal development. In the infantile type the abnormal growth is supposed to be a secondary result of primary disgenitalism.

In 1901 Froehlich first described the condition known as hypophysal obesity (*dystrophia adiposo-genitalis*). It is marked by obesity of enormous degree, by tumor of the hypophysis and by hypoplasia of the genital organs. Von Eiselsberg was able to benefit these patients by removing the tumors.

Animal Experimentation.—Experimental extirpation of the pituitary body was begun by Horsley in 1885 and continued by a number of investigators, but the results were unsatisfactory because of imperfect technic. In 1906 Paulesco introduced a new technic, making a lateral incision beneath the temporal bone. This permitted lateral dislocation of the brain, making easy the removal of the whole or a portion of the hypophysis. From his experiments Paulesco came to the conclusion that the pituitary gland is essential to life, and suppression of its function is rapidly followed by death. He believed that the vital part is the cortical portion of the epithelial (anterior) lobe.

Using a similar technic, Cushing found that the removal of only a portion of the anterior lobe caused metabolic disturbances and atrophy of the genital organs, but that extirpation of the whole anterior lobe or of the entire hypophysis resulted in death, which was less rapid in young than in old dogs.

Suspecting that dislocation of the brain incident to the Paulesco-Cushing method was a disturbing factor in the operation, Aschner reverted to the original method of operating through the buccal cavity. By improving upon the original technic, he was able to remove any part of the gland or the entire organ without injury to the neighboring parts of the brain or nerves.

Aschner thus demonstrated that the results obtained by Paulesco and Cushing were largely due to injury to the base of the brain caused by the wide opening of the third ventricle and the accompanying loss of cerebral fluid, by the dragging on the pedicle or infundibulum, and by injury to the tuber cinerium; and that although the gland played a very important rôle in the economy of the living organism, it is not essential to life. He showed, however, that the unimpaired condition of the hypophysis was essential to normal mental development and bodily growth. This was very strikingly demonstrated when extirpation was performed in young animals. He confirmed the observations of other investigators that the gland had a profound influence on proteid, carbo-hydrate and calcium metabolism, and that it was intimately connected with the other organs of internal secretion especially of the sexual glands. He also established the fact that sterility and lowered bodily re-

sistance to disease resulted from its absence and that abortion followed its removal.

Action of Pituitary Extract on Blood Pressure.—In 1894, Oliver and Schaeffer announced the epoch making discovery that an extract of the suprarenal gland had a marked effect on blood pressure. The following year they found that an extract made of the pituitary gland had a similar but not quite as powerful an action. Howell then demonstrated that the extract of the posterior lobe only produced this effect. He also established the fact that a second injection given within half to one hour after the first had no action. Present opinion seems inclined to the belief that the substance affecting blood pressure resides in the *pars intermedia* which is always removed with the posterior lobe.

Schaeffer and Vincent then showed that the extract possessed the property of depressing as well as raising blood pressure. They attributed this two-fold behavior of the extract to the existence of two active principles. Cyon afterward demonstrated that the extract also strengthened the heart action. He predicated, therefore, the existence of a third principle. Fühner, however, proved later that all these effects were, to a greater or lesser degree, common properties of the various active principles contained in the extract.

Introduction of the Preparation into Obstetric Practice.—Pituitary extract was first introduced into obstetric practice in 1909, by Bell of the Royal Infirmary of Liverpool, and by Foges and Hochstaetter (von Rosthorn's and Wertheim's Clinic) of Vienna. In November, 1909, Bell reported five obstetric cases in which pituitary extract was used. In December of the same year Foges and Hochstaetter reported their experience with a much larger number of cases. They began with the use of the preparation immediately after the announcement of Frankl-Hochwart and Froehlich in June, 1909, that the injection of pituitary extract has a marked effect on the abdominal organs, especially on the bladder and uterus. The latter observers in their experiments on lactating and pregnant rabbits, noted that after the injection of the extract the uterus contracted more vigorously, at the same time becoming more sensitive to faradization of the motor nerves. This phenomenon was independent of the blood pressure. Similar action on the uterus was noted by Dale as early as 1906.

Prior to our observations at Wertheim's Clinic it was already known from experimentation that the preparation was nontoxic to animals, and from observations by Pal and Falta, that it was non-poisonous to man. Foges and Hochstaetter, nevertheless, proceeded

with the greatest caution. They first used it on women with metrorrhagia in the lying-in period. It was first administered by mouth, 0.5 c.c. diluted in 50 c.c. of water. Then the dose was gradually increased to 30 c.c. of the undiluted solution given in the course of twenty-four hours. The preparation was well borne without causing nausea, disturbance of appetite or vomiting. Except for a slight increase in diuresis, no other effect could be noted, either with the smaller or larger doses. Given per os, the action on the uterus was slight, and no action on the blood pressure was noted. The preparation seemed to undergo decomposition in the gastrointestinal tract.*

The intramuscular injection of 0.5 c.c. of pituitary extract and the intravenous injection of 0.5 c.c. in 20 c.c. physiological salt solution were then tried on several patients without producing the slightest disturbance. There was no pain nor local reaction, but there was a rise in blood pressure which fell again in twenty to forty minutes.†

Having satisfied themselves that the preparation was well borne, Foges and Hochstaetter proceeded with its application in acute postpartum hemorrhage.

In multiparæ with flabby abdominal walls, it was noted that after the expulsion of the placenta, followed by atony of the uterus, not responding to massage, an injection of the extract together with slight massage caused the uterus to contract firmly and lastingly, and the hemorrhage ceased. In cases where a relaxation recurred, a repetition of the massage caused strong contractions. In several cases of Cesarean section it was found that the soft uterus would contract into a ball immediately after injection.

Its action as compared with ergotin was prompter, stronger, more lasting and more reliable. It also differs from ergotin in that the latter causes *contractions* of the uterus, whereas the former *sensitizes* the uterus. This was pointed out by G. A. Wagner, in charge of the obstetric division at the time of these investigations. It has been our practice since then to give both drugs combined. As

*Musser, of Philadelphia, who has made observations on the continuous administration of pituitary extract per os, reports that the prolonged use of the gland substance causes a rise of blood pressure, generally accompanied by increased pulse rate, increased diuresis, sometimes diarrhea, but no glycosuria. He used small doses of the powdered gland.

† My own observations with intravenous injections of the extract show that the method is accompanied by characteristic and somewhat disagreeable symptoms. Heaney has made similar observations and advises against the intravenous application.

compared with adrenalin, its action was not as transitory, and did not cause as marked a rise of blood pressure.

The action of the drug is so strong as to cause an over-irritability, at times amounting to tetany of the uterine muscles, so that we hesitated to use the preparation before the expulsion of the child or the placenta. But in 1911, when Hofbauer reported twelve cases in which he used the extract to excite labor pains, we immediately adopted his suggestion.

Intravenous Injection in the Rabbit.—The effect of pituitary extract on the heart, blood pressure, respiration and uterus in the human being so closely resembles its action in the rabbit that the effect of the intravenous injection in the latter will be discussed more in detail.

The effect on the blood pressure is peculiar; immediately after the injection there is a rise of blood pressure; this lasts about ten seconds followed by a fall of somewhat longer duration, and then again a rise of blood pressure lasting from fifty to sixty minutes before it entirely wears off. Cardiac action becomes stronger immediately after the injection, but this effect diminishes with the fall of the blood pressure. As the latter again rises, the cardiac impulse again becomes forcible. It remains thus even long after the return of blood pressure to normal. As pointed out by Cyon, this action is particularly characteristic of the hypophysis extract.

The action on respiration is also characteristic and reminds one very much of the phenomena of anaphylactic shock. Immediately after injection and corresponding with the rise of blood pressure there is a gradual diminution in the respiratory motion which finally ceases altogether and then as gradually recurs. The cessation in respiration corresponds to the maximum rise of the blood pressure, but does not depend upon it and may recur several times. This effect of the drug was first pointed out by Fuehner who showed that in carnivorous animals such as cats, etc., that is, animals that cannot be readily put into anaphylactic shock, these phenomena do not take place.

The action on the uterus is specific. The preparation acts on the whole isolated uterus or on a resected portion of it, as well as on the uterus *in situ*. It acts well and promptly on the uteri of even young and virgin rabbits. The uteri of large rabbits are so sensitive to it that they may give tetanic contractions. The effect of the preparation primarily is to heighten the tone of the uterus, the individual contractions being increased but slightly.

Intravenous Injections in the Human Being.—Most of these observations were made on women in the lying-in period. Twenty or thirty seconds after the injection of 1 c.c. of the extract, the patient is suddenly taken with an uneasy feeling, dizziness, a constricting painful sensation all over the body, shortness of breath, and tossing of the head from side to side. If the breasts are congested they become more painful, the uterus contracts strongly and painfully, and a sudden gush of lochia appears. Cramp-like intestinal pain is experienced. Some patients become very pale, others complain of a throbbing headache. Three or five minutes after the injection there is a desire to void urine. The blood pressure is raised 20 to 30 mm. The entire train of symptoms lasts about one-half to two minutes. The intestinal cramps last a few minutes. The blood pressure remains raised thirty minutes or over.

Preparation of the Extract.—The posterior lobe of the hypophysis is minced and ground up, boiled, macerated in a 0.2 per cent. solution of acetic acid in water, filtered, and the filtrate evaporated down to a very small volume. To the concentrated solution, enough normal saline is added so that each cubic centimeter of the liquid equals 0.2 gram of the fresh gland. The gland of the steer is generally used for making the extract. Originally the extract was put up in bulk, but it was found to deteriorate on exposure, probably due to bacterial action. Repeated boiling does not injure the preparation, but contamination with alcohol does. The preparation is now put up in ampules of 1 c.c.

Isolation of Active Principle.—A number of investigators (Schaefer, Vincent, Dale, Cyon, Houssay, Engeland and Kutscher) have attempted to isolate the active principles of pituitary gland, but only recently did the investigators in the laboratories of Meister Lucius and Bruning, the manufacturers of synthetic suprarenin, succeed in isolating from the extract the active constituents of the gland.

It has been found that an albumen-free extract of the infundibular portion of the hypophysis contains eight different constituents. The intensive action of the hypophysis extract is apparently due to four of them, which are precipitated by phosphotungstic acid. These active principles can be isolated from one another by fractional precipitation. The filtrate left behind contains the other four substances, but these have no marked action on the uterus, blood pressure or respiration, and therefore are of no practical importance.

The precipitate decomposed by barium hydrate and neutralized with sulphuric acid forms a crystalline salt, which is of a faint yellow hue, dissolves readily in acidulated water and with difficulty in

alcohol, acetone, acetic ether, etc. This salt is sold under the trade name of "Hypophysin" and contains the four active principles in weak physicochemical combination.

Hypophysin: the four active principles of the extract	Action on		
	Uterus	Blood pressure	Respiration
1. Colorless salt, forms insol. picrate	Slight.	Typical.	Slight.
2. Colorless salt, forms sol. picrate	Marked.	Marked.	Marked.
3. Yellowish salt, sol. in methyl alcohol of weak acid reaction.	Strongest.	Marked.	Marked.
4. Brittle hydropscopic mass, sol. in methyl alcohol.	Marked.	Weak.	Weak.

From an examination of the above table it will be seen that the four ingredients have no actions that are peculiar and distinct, but that each of them produces all the effects noted, but in varying degree. Product 1 acts principally on blood pressure, 2 and 3 act strongly on blood pressure, uterus and respiration, whereas 4 exerts a marked action on the uterus alone. The action of the ingredients varies with the species of animal used.

Dosage.—In obstetric cases one dose generally suffices. The dose may be repeated in one hour when the action has worn off. If there is no response to the first injection the dose may be repeated in twenty to thirty minutes. The injection may be given six or more times without any injurious effects. In metrorrhagia, the preparation is given once a day or every other day. In cases of placenta previa, on account of the drug's powerful action, it is best to commence with a small dose, not more than 0.25 c.c., and repeat when required.

The use of the drug is remarkably free from danger, even when given in enormous doses. In the rabbit 0.1 c.c. produces the maximum effect on the uterus, but 10 c.c. or 100 times the required dose may be given without injury. In the human being 1 c.c. has a full effect on the uterus. It is thus seen by analogy that at least 100 c.c. could be given with impunity, and weight for weight, twice the latter dose might even be given.

Method of Administration.—In obstetric practice the preparation is best administered intramuscularly. The injection is not accompanied by pain and the effect is prompt. In cases of slightly

dilated cervix where tetany is feared, the preparation should be administered subcutaneously. This is accompanied by little pain and slightly delayed action. It is advisable in the latter class of cases to precede the administration of pituitary extract by the injection of some narcotic. It should not be given intravenously, except in case of shock or severe hemorrhage, and then is best given with an infusion of normal salt solution. A good method of treating this class of cases is by giving 1 c.c. or more of pituitary extract diluted in 1000 c.c. normal salt solution by hypodermoclysis, injecting under the breast. The action is as effective and almost as prompt as with the intravenous method, and far simpler.

In cases of atony or postpartum hemorrhage or metrorrhagia, it is best, on account of its sensitizing action, to combine it with some preparation of ergot. In chronic diseases associated with low blood pressure it may be given, according to Musser, by mouth for prolonged intervals several times a day.

CITATION OF CASES.*

Inertia Secondary; Head at Outlet.—Cases of this class respond splendidly to the injection of pituitary extract. If the head is on the perineum or at the outlet, the effect is prompt and delivery is rapid. Often the child is born in less time than it takes to sterilize the forceps. Cases I and II are typical of this class.

CASE I.—B. C., Para-i. May 13, 3 P.M., labor pains began; May 14, 9.30 A.M., cervix fully dilated; 11.30 A.M., labor pains stopped; 4.10 P.M., head at outlet; sagittal suture in right oblique diameter; small fontanelle front and left. 1 c.c. pituitary extract administered; 4.18, birth of child; 4.28, placenta expelled. In labor previous to injection over twenty-four hours, no pains for four hours and forty minutes. Pituitary extract 1 c.c.; delivery in eight minutes.

CASE II.—C. L., aged twenty-four, para-i. April 8, 3 P.M., labor pains began; April 9, 10 A.M.; dilatation 3 1/2 fingers; papaverin gr. ii by mouth; patient became somnolent. 4.35 P.M., dilatation complete; head at outlet; sagittal suture in anteroposterior diameter. No pains. Pituitary extract 1 c.c.; 5.10 P.M. birth of child; 5.20 P.M., placenta expelled.

The above cases also show that contrary to the claims made by some obstetricians, the expulsion of the placenta is not interfered with, but rather that the third stage of labor is shortened. In each

* Cases I, VIII, XVIII, XXIV, XXX, XXXI, XXXII are from the Jewish Maternity; cases II, V, IX, X, XII, XIV, XV, XVI, XIX, XXV, XXVI, XXVII, XXVIII, XXIX, and XXXIV are from the Luydenham Hospital, cases XX, XXI, and XXXIII are from Wertheim's Clinic; cases III, IV, VI, VII, XI, XIII, XVII, XXII, and XXIII, are from private practice.

case the placenta was expelled ten minutes after the birth of the child. Occasionally the placenta follows immediately.

Inertia Secondary; Head in Inlet.—To get the optimum effect, the extract is given when dilatation is about complete and the head is still in the inlet. Cases III and IV are examples.

CASE III.—F. L., aged twenty-seven, para-ii. Nov. 26, 9 A. M., in labor seven hours, dilatation complete; pains had begun to weaken and were less frequent; membranes ruptured; head in the inlet. Morphine sulph. gr. 1/8, hyoscine hydrobromide gr. 1/400, pituitary extract 1 c.c. Pains became strong, descent was rapid; head on perineum; chloroform administered 9.35, birth of child, 10 1/2 lbs. Delivery rapid, little or no pain.

CASE IV.—S. B., aged twenty-five, para-ii. 1 A. M., two fingers dilatation; head at brim; pain moderate. 3 A. M., morphine gr. 1/4, hyoscine hydrobromide gr. 1/400; pain relieved. 6.45 A. M., cervix obliterated; membranes ruptured artificially. Very little amniotic fluid. Head at brim not engaged. Pituitary extract 0.5 c.c. 7.10, birth of child.

Inertia Secondary; Dilatation Incomplete; Head Deep in Pelvis.—The preparation may be given without fear or hesitation when the head has passed through the pelvic inlet, even when dilatation is incomplete as in Case V.

CASE V.—B. K., aged twenty-two, para-i. 1 A. M., pains began; 9 A. M., external os 3 fingers; head in mid-plane; 11.30 A. M., no progress; pains weak. Pituitary extract 1 c.c.; 12.20 P. M., birth.

Inertia, Primary.—The physician should acquire considerable experience in the use of the extract before employing it in primary inertia. Particularly if the head is above or at the inlet is caution imperative, and good judgment necessary. However the effect is often astonishing as illustrated in Cases VI and VII.

CASE VI.—S. B., thirty-seven years, para-vii. 6 A. M., patient had annoying ineffectual pains for two days. Internal os dilatation 2 1/2 fingers; membranes intact; head at inlet. 10 A. M., pain weak and infrequent, no progress in labor. Pituitary extract 1 c.c. pains strong and frequent. 10.20, baby born with membranes intact.

CASE VII.—C. S., age thirty-one, para-vi. Dec. 8, 11.40 P. M., slight pain for two hours; dilatation two fingers; membranes intact; head at inlet. Pituitary extract 0.5 c.c.; pains became strong and effective. 12 P. M., pantopone gr. 1/3 per hypo; pain relieved. Dec. 9, 12.20 A. M.; birth of child with slight pain.

The preparation may sometimes be employed as a diagnostic agent to differentiate between false and weak labor pains. In the former the effect will be nil or will soon wear off, whereas if the woman is really in labor the pains will be augmented and strengthened as in Case VIII.

CASE VIII.—A. S., aged twenty-eight, para-ii. Admitted to hospital July 7, 1913 at 2 A. M. Labor pains for preceding four hours—two fingers dilated—membranes intact; head at brim; pains moderate. At hospital for fifteen hours and then sent home. Readmitted July 8, at 4 A. M.—no change. 10 A. M., strychnine gr. $\frac{1}{30}$; 2.30 P. M., quinine gr. xx; 5 P. M., condition same; 5.12, pituitary extract administered; 5.19, strong pains every four minutes; 7.55, birth of child; large amount of meconium in liquor amnii; child's body bathed with meconium.

Occasionally there will be a discharge of meconium even before birth of child as illustrated by above cases.

Protracted Labor.—Pituitary extract is useful in cases of protracted labor, especially where there is a previous history of difficult confinement.

CASE IX.—M. A., aged thirty-five, para-vi. Last delivery instrumental; remained sick in bed for weeks, baby died a few weeks after birth. April 10, 10 A. M., labor pains began; April 12, 11 A. M., external os two fingers; cervical canal not entirely obliterated; head with large diameter in inlet; papaverin gr. ii by mouth—patient slept. 6.15 P. M., slight change; papaverin gr. ii by mouth. 6.55, pituitary extract 0.5 c.c.; 7.47, birth of child; 7.50, placenta expelled.

Patient in labor fifty-seven hours before receiving extract. After the injection labor terminated in fifty-two minutes. Placenta was expelled in three minutes.

In cases where it is advisable to hasten the delivery on account of general or local conditions, such as fever or infection, the drug may be administered with advantage as illustrated in Case X.

CASE X.—C. Z., aged twenty-four, para-i. Ill with subacute gonorrhoea. April 19, 8 P. M., pains began; April 20, 6.30 A. M., external os four fingers; membranes intact; head at inlet; pains weak. Pituitary extract 1 c.c.; 7.45, birth of child; lying-in period uneventful.

It would certainly have been inadvisable to have performed a forceps operation in this case, and the rapid delivery was a favorable factor in the outcome.

Premature Rupture of the Membranes.—This is certainly an undesirable complication of labor. Such cases were formerly treated by the introduction of a colporhynteur or metrorhynteur. This method has disadvantages. I prefer to use pituitary extract, and would recommend that the same caution be observed here as in primary inertia. Cases XI and XII are illustrations.

CASE XI.—G. W., aged twenty-three, para-ii. 1 A. M., membranes ruptured; no pains; 3. A. M., cervix admitted one finger; cervical canal

2 cm. long; head at inlet. Pituitary extract 5 minims; 4.50 A. M., birth.

CASE XII.—F. K., aged twenty-five, para-i. 5 A. M., membranes ruptured; 12.15 P. M., external os one finger; cervical canal 2 cm. long; head at brim, R. O. A. no pains. Pituitary extract 3 minims; pains began in 20 minutes; 8 P. M., birth.

Breech Presentation.—Breech presentation is no contraindication against the use of the extract as can be seen from Case XIII. On the contrary the drug sometimes obviates intrauterine manipulations, which is certainly a great advantage.

Some obstetricians claim that the preparation increases the difficulty of the delivery of the after-coming head, because of the cervix contracting on the head. My experience has been otherwise, although very limited in this class of cases. Perhaps further experience will determine this question. It might be said, however, that from a theoretical consideration, contraction of the cervix is not likely to occur, because the cervix after it is once dilated contracts very gradually during the lying-in period.

CASE XIII.—H. B., aged twenty-two, para-i. Jan. 19, 8 P. M., pains began; Jan. 20, 11.50 A. M., os almost obliterated; breech in the inlet. Pituitary extract 0.5 c.c.; 12.30 P. M., breech at the vulva; the body followed immediately; delivery of arms by Mueller technic; head Smellie-Veit. Cord four times around the neck. Moderate asphyxia. No laceration.

CASE XIV.—N. G., aged twenty, para-i. Generally contracted pelvis; interspinous twenty, intercrystal twenty-three, intertrochanteric twenty-six. July 20, 3 P. M., labor pains began; July 21, 10.30 A. M., external os four fingers dilatation; membranes ruptured; breech just entering the inlet; pituitary extract 0.5 c.c. 11.20, breech at outlet. Pituitary extract 1 c.c.; chloroform anesthesia; slight traction on breech; episiotomy; arms delivered with ease; delivery of head by Smellie-Veit; child cries; weighs 7 1/2 lbs.

That the drug is safe so far as the child is concerned may be inferred from the above cases. With the cord four times around the neck the child could be resuscitated.

Forceps.—That the preparation does not replace the forceps operation entirely is shown by Case XV.

CASE XV.—C. O., aged twenty-three, para-i. April 3, 9 P. M., pains began. April 4, 2 P. M., external os 2 1/2 fingers; membranes intact; head with small diameter in inlet, L. O. A. 6 P. M., dilatation 3 1/2 fingers; pituitary extract 0.5 c.c. 8.15, external os obliterated; head at outlet; sagittal suture in anteroposterior diameter; head incompletely flexed. Morphine gr. 1/8; atropine gr. 1/150; pituitary extract 0.5 c.c. Pains became strong but little progress. 8.35, delivered by forceps.

In the above case the drug was administered when the head was at the inlet and the forceps was applied when the head reached the outlet on account of incomplete flexion.

Circumstances frequently arise that make it necessary for the sake of the child or the mother to hasten delivery either before the cervix has fully dilated or before the head has descended into the pelvis. By a preliminary injection of pituitary extract, it is possible to convert a high forceps operation into a low one, and in cases of incomplete dilatation the cutting operation or manual dilatation may be dispensed with. I have on a number of occasions been called by attending physicians to perform forceps operations in cases where examination revealed that the cervix was only three fingers dilated. Soon after the injection of pituitary extract, the operation was carried out with safety and ease. Case XV illustrates this.

Threatened Asphyxia.—CASE XVI.—B. M., aged twenty, para-i. Pelvis slightly contracted; labor pains began 5 A. M.; 5.10 P. M., external os less than three fingers dilatation; head in mid-pelvis. R. O. P., passage of meconium, but fetal heart sounds good. 5.35, pituitary extract 0.5 c.c.; 6.00, dilatation complete. Low forceps. Episiotomy. Child 9 lbs., mild asphyxia.

What might sometimes be accomplished in unfavorable cases by the use of the extract is shown in Case XVI.

CASE XVII.—W. J., para-iii. Patient in labor for more than a day; physician diagnosed brow presentation and advised craniotomy. Os and cervix obliterated; head in inlet; incomplete flexion; small fontanelle posterior. Exostosis on left side of pelvis. Gave pituitary extract 1.5 c.c.; pains became strong; delivery in 40 minutes.

Induction of Labor.—The injection of pituitary extract will induce neither labor nor abortion. It will, however, when used in conjunction with a metrorrhynch, prove effective, whereas a metrorrhynch alone might fail. Case XVIII is an example.

CASE XVIII.—R. B., aged thirty-nine, para-xi. Marked hydramnion with objective signs and subjective symptoms. Nov. 7, one week before calculated date of labor, Voorhees bag introduced. After 7 hours; no pains. Nov. 8, patient transferred to the hospital; larger bag introduced; vagina packed. After six hours no pain developed; pituitary extract 1 c.c. was administered. Fifteen minutes thereafter strong and frequent pains ensued. Three hours later, packing and bag expelled with complete dilatation of cervix. Membranes ruptured artificially; several liters of fluid escaped. One hour later, pains becoming weak, another injection of pituitary

extract was given with good results. Seventeen and a half hours after the onset of labor the fetal head was still at the pelvic brim, but owing to the development of temperature (102.5) high forceps was resorted to. Extraction without difficulty; baby 11 lbs. 12 ozs. Pituitary extract 1 c.c.; no atony; no hemorrhage. Lying-in period fever-free.

That the preparation is not contraindicated in cardiac diseases but may be used with good effect, is demonstrated by Case XIX.

CASE XIX.—D. M., aged twenty-one, para-i. Double mitral and aortic lesions. 4.30 P. M., digalin m/x; strychnine sulph. gr. 1/40; external os 3 1/2 fingers; head in mid-pelvis; pulse 108. 5 P. M., pituitary extract 1 c.c. 5.45, full dilatation. Delivery by forceps. Pulse 126. Premature baby (nine lunar months) died in twenty-four hours. Lying-in period uneventful.

Atony; Postpartum Hemorrhage.—In this desperate condition, pituitary extract found its first application, and it has often proved a life saver as Case XX demonstrates.

CASE XX.—The fetal heart sounds irregular. The fetal head deep in the pelvis, the sagittal suture in transverse diameter. The os not completely obliterated.

Episiotomy; child extracted with forceps. The patient bled profusely; examination showed a slight tear of cervix, which was sutured immediately.

The uterus became atonic; the patient became very anemic; and the cervical canal was tightly packed. A Momburg bandage was prepared. Meanwhile the patient was given 1 c.c. of pituitrin and 2 c.c. of ergotin. Hypodermoclysis of 1000 normal saline; oxygen inhalation. Uterus contracted firmly, Momburg not applied.

In this case a forceps application was performed when the cervix was incompletely dilated with a tear resulting. The consequent loss of blood combined with the atony would probably have proved fatal if the uterus had not responded to the injection of the extract.

Abortion and Sterilization.—Not only is the extract valuable in cases of atony due to postpartum hemorrhage, but it is extremely useful in cases of hemorrhage incident to abortion. Where packing was formerly resorted to, pituitary extract has proven to be an excellent substitute, possessing the added advantage of reducing the size of the uterus. In cases where the uterus is emptied and sterilization performed per vagina at one sitting, the extract is invaluable because packing of the uterus is dispensed with and a less bulky organ results. Case XXI is illustrative of this class.

CASE XXI.—C. S., aged forty, para-i. Married six months; first menses at twelve—always regular; last menses Feb. 19, 1911; suffered

with cough since the age of twelve; lost twenty-two pounds in last three months. At time of admission weighed 125 1/2 pounds; evening temperature 101.5 to 103; night sweats. Both apices infiltrated, left side fine crepitant râles. Uterus corresponded to a pregnancy of 3 1/2 months. Cervix cone shaped, external os closed. Patient asked to be sterilized, but refused to have uterus extirpated.

Operation.—Transverse incision over the anterior surface of the cervix 2 1/2 to 3 cm. above the external os; separation of anterior vaginal wall; separation of bladder beyond internal os. Median incision through entire thickness of anterior wall of cervix; uterine contents emptied manually. Pituitary extract and ergotin 1 c.c. of each given intramuscularly. Median incision closed with interrupted sutures. Bleeding moderate. Plica vesicouterino opened. Uterus small and well contracted. Fundus grasped by hook and rotated anteriorly; excision of a wedge-shaped portion of the cornua right and left including a section of the tube. Wound covered with peritoneum. Plica closed; vaginal wound closed except for a small opening for the insertion of an iodoform drain. Instead of a large uterus as is common with packing, in this case the uterus was small and easily manipulated.

In delivery in *Dämmerschlaflf* ("Twilight sleep"), according to the method of Krönig and Gauss, the extract again proves invaluable. The combination of morphine and scopolamine relieves the suffering mother, but has the disadvantage of paralyzing the uterine muscles. This weakens the pains so that labor is often protracted and sometimes fails to terminate spontaneously. By the use of pituitary extract, however, the paralyzing effect on the uterus is overcome in a great measure.

Cases XXII and XXIII are typical examples of a successful "*Dämmerschlaflf*" aided by the use of pituitary extract.

CASE XXII.—H. B., aged twenty-nine, para-ii. Oct. 1, 6 P. M., labor pains began. Oct. 2, 6 A. M., os 3 fingers dilatation; membranes ruptured; head in the inlet, L. O. A. First injection morphine gr. 1/6, scopolamine gr. 1/150; second injection, 7.05 A. M., scopolamine gr. 1/300; third injection, 8.35 A. M., scopolamine gr. 1/400; fourth injection, 9.35 A. M., scopolamine gr. 1/400; fifth injection, 10.35 A. M., scopolamine gr. 1/200; 10.40, anamnesia incomplete; 11.15, complete; 11.45, doubtful; sixth injection 11.50, scopolamine gr. 1/400; 12.20 P. M., anamnesia complete; 1 P. M., doubtful; 1.45 P. M., memory good; seventh injection 1.45 P. M., scopolamine gr. 1/200; 2 P. M., anamnesia doubtful; eighth injection 2.45 P. M., scopolamine gr. 1/200; 3.00 P. M., anamnesia complete; pains weak; pituitary extract 1 c.c.; pains become stronger; ninth injection 4.25 P. M., scopolamine gr. 1/400; 5.15, birth of child in complete anamnesia; 5.38, placenta expelled.

The patient received altogether of morphine gr. 1/6, of scopolamine gr. 7/200, and pituitary extract 1 c.c.

CASE XXIII.—H. B., aged twenty-three, para-i. Aug. 9, 10 P. M., one finger dilatation; Aug. 10, 2 A. M., dilatation about the same; head in the pelvis; pains strong and regular. First injection 2 A. M., morphine gr. $\frac{1}{8}$, hyoscine hydrobromine gr. $\frac{1}{400}$; second injection 2.30 A. M., hyoscine gr. $\frac{1}{400}$, pituitary extract 1 c.c.; third injection 3 A. M., hyoscine gr. $\frac{1}{400}$; fourth injection 3.30 A. M., morphine gr. $\frac{1}{16}$, hyoscine gr. $\frac{1}{400}$; fifth injection 4 A. M., hyoscine gr. $\frac{1}{400}$; sixth injection 4.30 A. M., hyoscine gr. $\frac{1}{400}$, pituitary extract 1 c.c.; seventh injection 5.30 A. M., hyoscine gr. $\frac{1}{400}$; eighth injection 6.30 A. M., hyoscine gr. $\frac{1}{400}$, pituitary extract 1 c.c.; ninth injection 7.15 A. M., hyoscine gr. $\frac{1}{400}$; 7.30, birth of child in complete anamnesia.

The patient received during a period of five and a half hours morphine gr. $\frac{3}{16}$, hyoscine gr. $\frac{9}{400}$, pituitary extract 3 c.c.

As can be seen from some of the above cases, whenever opium or its derivatives was given I added pituitary extract to overcome the paralyzing effect.

Eclampsia.—It is still an open question whether pituitary extract should be used in cases of eclampsia. It would seem that owing to the already high blood pressure in this condition, it would be inadvisable to use a preparation that may raise it further. But it is a question if the high blood pressure is anything more than an accompanying symptom, and whether we are not erring in exerting our therapeutic efforts in combating it.

Should future observations show that pituitary preparations are injurious on account of their effect on the blood pressure, we could still get the beneficial effects on the uterus by selecting active principle 4 of hypophysin. This is a colorless crystalline salt with a marked specific action on the uterus, and without any effect on the blood pressure.

CASE XXIV.—I. S., aged twenty-four, para-i. Aug. 9, 1.30 A. M., external os one finger; 4.55 A. M., birth of child; duration of labor eight hours. 7 A. M., convulsions; blood pressure 220 mm. Urine boils solid, granular and hyaline casts. 2.30 P. M., for past 7 $\frac{1}{2}$ hours $\frac{1}{2}$ oz. urine. Pituitrin 1 c.c.; blood pressure rose from 170 to 190; within the next 6 $\frac{1}{2}$ hours patient voided twenty-four ounces of urine.

It is to be noted that pituitrin was given here not to hasten labor, but rather for its beneficial action on the kidneys.

It is a well-established fact that in eclampsia improvement sets in with increased diuresis, whereas when suppression of the urine continues the patient rapidly grows worse.

Nephritis is not a contraindication for the use of pituitary extract. The kidney condition may even be benefited by the administration of the drug. Frank considers the diuretic action of

the preparation superior to all other substances. This is due to the action of the drug on the kidney cells as well as on the kidney circulation.

Nephritis with Preeclamptic Symptoms.—CASE XXV.—E. F., aged twenty-five, para-i. Marked edema of abdomen, lower limbs and vulva. Urine boils solid, numerous hyaline and granular casts. Patient complains of epigastric and precordial pain. June 29, 1 A. M., labor pains began with rupture of membranes; 10 A. M., vagina narrow and rigid; external os one finger; cervix rigid; head with small diameter in inlet; 1.30 P. M., no progress; pituitary extract 5 minims.; 5 P. M., pituitary extract 1 c.c.; 8.30 P. M., morphine gr. 1/8. June 30, 1 A. M., dilatation incomplete; head with large diameter in the inlet. Incision of the anterior lip of the cervix for 3 cm., Mockenrodt incision of vagina. Extraction of living child by forceps. Healing of cervix and vagina by primary union. In this case it became necessary to resort to operation in order to complete the delivery, but we had to deal with an unusually difficult case.

In cases of moderate contraction of the pelvis, pituitary extract may be used with advantage to strengthen the pains necessary to overcome the obstruction, or to overcome the resulting secondary inertia after the obstruction had been passed, as in Case XXVI.

CASE XXVI.—M. C., aged twenty-seven, para-ii. First child eighteen months ago, four days in labor; instrumental delivery; dead child. Pelvis generally contracted. Measurements: interspinous 23; intercrystal 25; intertrochanteric 30; conjugate diagonal 10 3/4; conjugate vera 9 plus. June 21, 8 P. M., labor pains began; June 22, 11 A. M., four fingers dilatation, head at inlet; morphine gr. 1/6, slept for two hours; 2 P. M., head with small diameter in the inlet; 4 P. M., pituitary extract 1 c.c., pains strong every three minutes; 6.30 P. M., membranes ruptured, head at perineum. No pains; pituitary extract 5 minims; 7 P. M., birth of child, eight pounds.

Cesarean Section.—In Cesarean section pituitary extract should be administered as a prophylactic agent against excessive bleeding and atony of the uterus. The extract should be injected at the outset of the operation. To be followed later when suturing of the uterine wound is well under way by an injection of ergot. If too long an interval elapses between the injection of the combination of pituitary extract and ergot and the closure of the uterine wall, the excessive contraction and hardening of the uterus may interfere with suturing as in Case XXVII.

If uterine atony occurs the drug may be injected direct into the uterine muscle. The response is immediate.

CASE XXVII.—R. K., aged twenty-five, para-iii. Two previous Cesareans. Jan. 16, elective Cesarean. At the outset pituitary

extract and ergot, 1 c.c. of each, administered intramuscularly. Extensive adhesions were found between uterus, abdomen, omentum and intestines. Some time was spent in separating the adhesions before incising the uterus. After delivery of the child, the uterus contracted firmly into a ball, and there was very little bleeding. The uterine wall was 5 cm. thick rendering suturing more difficult.

CASE XXVIII.—E. L., age thirty, para-v. Feb. 4, Cesarean section for complete placenta previa. Incision of abdomen above the umbilicus. Incision of the uterus *in situ*. Simultaneously with the incision of the uterus, pituitary extract and ergot, 1 c.c. of each, given intramuscularly. Closure of uterus in four layers. Resection of a wedge-shaped portion of the cornua and a portion of the tube right and left. Uterus well contracted; very little bleeding.

Placenta Previa.—CASE XXIX.—P. M., aged thirty-five, para-iii. Pregnant eight lunar months; bleeding on and off for four preceding weeks, more marked during the last week. May 29, 8 P. M., admitted to the hospital, bleeding profusely, external os two fingers dilatation; placenta to left filling almost the entire os. Membranes intact L.O.A. Braxton-Hicks performed; leg brought down, five-pound weight tied to leg. 8.30 P. M., pituitary extract 1 c.c. Expulsion of the child proceeds slowly and without any bleeding. 9 P. M., birth of dead fetus; cervix intact; no bleeding. Nevertheless, packing of lower uterine segment. Hypodermoclysis with pituitary extract.

CASE XXX.—D. K., age forty, para-x. 4.15, dilatation 2 1/2 fingers; marginal placenta; active bleeding; membranes intact; 4.25, pituitary extract; bleeding less; 5.05, bleeding again, membranes ruptured; 5.20, pituitary extract; four fingers dilatation; delivery follows in ten minutes, no bleeding; placenta expelled in seven minutes.

Sepsis and Intestinal Paresis.—Klotz recommends the use of pituitary extract in peritonitis because the preparation combines three actions that play an important rôle in this condition. These are: 1. The stimulating action on the peripheral blood-vessels and direct tonic action on the heart. 2. The stimulating action on the intestines, overcoming paralysis and distention. 3. The action on the kidneys, flushing the toxins out of the system. He reports favorable results in the use of the drug in this condition. I have already called attention to the experimental work of Aschner, showing that the pituitary gland helps the organism to resist and overcome infection.

CASE XXXI—H. B., age thirty-three, para-iv. May 12, placenta previa centralis. Bleeding profuse; packing with iodoform gauze; version on the foot; expulsion of child. Acute anemia, tear of cervix. Suture of tear and packing. Hypodermoclysis and pituitary extract. May 17, hemoglobin 25 per cent. Infection of lower

uterine segment. Marked abdominal distention. Various forms of medication gave no relief from distention. Pituitary extract 1 c.c. every four hours gives relief. Abdominal distention recurs several times, but always responds to pituitary extract. Patient died from cardiac degeneration at the end of seven weeks. We did not intend to treat the septic condition by the use of pituitary extract. It was administered to relieve abdominal distention. In abdominal distention following Cesarean section or laparotomy the preparation gave us good results.

Retention of Urine.—Pituitary extract acts on the bladder as well as on the intestinal tract. It will often overcome paresis of the former, when everything else has failed. It acts best when given at the time the bladder is distended.

CASE XXXII—C. L., age twenty-seven, para-ii. L. O. P. labor prolonged, occiput rotates posterior, birth spontaneous at 11.40 A.M. Next day bladder distended. To get patient to void urine, she is made to sit up; cold and warm irrigations are used. Strychnine is given hypodermically with no result. At 9 A. M., 1 c.c. pituitary extract. Ten minutes thereafter, patient empties bladder.

Osteomalacia.—This condition which is caused by or is intimately associated with pregnancy, has thus far resisted all medical treatment. Even removal of the ovaries which is the last resort in such cases has not always produced relief. Here again such a harmless measure as the injection of the extract may be followed by marked improvement.

CASE XXXIII.—M. P., aged forty-five. 1887 one birth, labor and lying-in period normal. After that menses regular until one and a half years ago. Since then irregular, though never missed. For past three years cutting pains in both lower limbs. For two and a half years pain in small of back. The symptoms were at first intermittent, but for the past year were continuous. Patient walked poorly for the past one and a half years. Patient became lop-sided, and her clothes became too long for her. Dec., 1910, patient was admitted to the clinic; could hardly walk. Pain on pressure in thorax and pelvis; spontaneous in back and limbs; spasm of the abductor muscles.

Therapy.—Adrenalin 0.5 to 1.5 c.c. daily with intervals of forty-eight hours for two months; no marked improvement. Pituitary extract 0.5 c.c. daily, discontinued at intervals; marked improvement at the end of one week.

Pituitary Extract as a Cause of Rupture of the Uterus.—It seems that with the introduction of pituitary extract into obstetric practice the frequency of rupture of the uterus has increased. I have

personal knowledge of three cases of ruptured uteri following the administration of the drug. In the first case it was evident that the preparation had no influence in the production of the tear. In the second instance a careful analysis of the case left the question undecided. In the third case, which is cited here, the extract probably helped to produce the accident.

CASE XXXIV.—J. M., aged thirty-seven, para-x. Heart and lungs negative, pulse 86. Urine boils solid; no examination made of the sediment. June 19, 7 P. M., labor pains began; 10 P. M., two fingers dilatation, old deep tear of the cervix, left anteriorly. Membranes intact; head at the inlet. Patient complains of pains in the legs, especially on flexion. 11 P. M., dilatation four fingers; membranes ruptured artificially. Pituitary extract 1 c.c.; pains in legs increase. June 20, 12.45 A. M., patient becomes waxy pale, is pulseless, perspires and lies on her right side. Patient is stimulated and pulse improves. 1.45 A. M., full dilatation(?); bleeding on examination; excruciating pain. 2.30 A. M., patient suffering intensely, screaming continuously and begging for chloroform. Face ashen blue, lips puffed up. Pulse rapid and small. No fetal heart sounds heard. Abdomen somewhat tender. Patient continues to have labor pains; no escape of fetus into abdominal cavity. Very dark blood escapes from the vagina. Head at the inlet in left side of the pelvis. Anterior to it a large tear of the uterus. Child extracted by forceps with ease. Patient continues to grow worse. Immediate laparotomy with extirpation of the uterus. Patient dies soon thereafter. Examination reveals a tear beginning at the left anterior edge of the cervix running obliquely upward and extending up to the center of the uterus. Hematoma of the left broad ligament and extending upward to the lower pole of the kidney. In this case the patient was having strong regular pains and dilatation was proceeding rapidly. There was no indication for the administration of pituitary extract. The fault was not with the drug; it was simply a case of poor judgment. Indeed, it was worse than poor judgment; it was meddling obstetrics.

Where disease or injury or marked thinning of the lower uterine segment exists that part of the uterus should not be subjected to additional strain by strengthening the expulsive power of the uterus. This was the consensus of opinion even before the introduction of pituitary extract. However, in placenta previa (incomplete) a condition marked by friability of the lower uterine segment, I have had no ill effects from the use of the drug.

In conclusion, I wish to say that the preparation will probably find a place in the treatment of sterility and possibly also where there is a tendency to habitual abortion. I am not prepared to form any deductions as to these classes of patients.

The cases cited above are illustrative of what may be accomplished with the drug in various obstetric conditions. They do not comprise all the cases in which the preparation was employed, but are selected from a very large material in which it has been used with satisfaction.

Cervix.—Special Action.—Cases have been reported where the partially dilated cervix closed after administering pituitary gland, and it has been suggested that the substance has a specific contractile action on the cervix. I have not come across such cases in my experience, nor do any other facts in regard to the action of the preparation warrant the inference of special action on the cervix. Dilatation of the cervix depends upon three factors:

1. The strong peristaltic contractions of the body of the uterus.
2. The retraction of the lower uterine segment.
3. The hydraulic pressure acting on the weakest part of the uterus.

The uterine contents press against the defect in the uterus (internal os) and with wedge-like action force it open. This is exemplified in women with rigid abdominal walls as in primiparæ where the weak internal os gives way to the hydraulic pressure and tends to become obliterated even before labor sets in. It is therefore necessary to make sure before pituitary extract is administered that one of the large parts presents, or that the bag of waters tends to enter the cervical canal. In the absence of a presenting part, or of a hydraulic bag, dilatation will not proceed, and the ring might even contract. This holds good whether pituitary extract is administered or not.

Action on the Child.—Immediately after injection there is a slowing of the fetal heart rate. This soon returns to normal. Many children are born pale; this may be due to the action of the extract on the capillaries of the skin. On account of the shortening of the interval between pains, where a large dose is given, asphyxia of the child may possibly ensue in spite of rapid delivery. After the injection of pituitary extract, meconium often appears in the liquor amnii. This does not indicate danger to the child, but is probably due to the action on the gastrointestinal tract of the fetus.

Contraindications.—Pituitary gland, like all active drugs, must be used with judgment and discretion. I know, however, very few contraindications to its use. Of those that may be mentioned are: interference with labor due to abdominal or vaginal fixation of the uterus; interference due to tumors blocking the pelvis; thinning of the lower uterine segment; absolutely contracted pelvis, or relatively contracted pelvis with no tendency of the head to engage; rigid

undilatable cervix; transverse presentation before the position has been corrected; hydrocephalus or monstrosity.

Cardiac disease is not necessarily a contraindication, the extract being one of the very best known cardiac tonics. Even a very high blood pressure may not be a contraindication because it is characteristic of the preparation that its action on the circulation is most marked when the blood pressure is low but has very little effect when the same is high. Neither is contracted pelvis a contraindication. On the contrary, the extract has a decided favorable effect in this class of cases, because a greater effort is necessary to force the head through the pelvis and the uterus may become exhausted before delivery is complete or even before the head has entirely passed through the inlet.

COMPARISON WITH OTHER DRUGS.

Adrenalin.—All pressor substances have a marked action on the uterus. Chief among these is adrenalin, which was used by Neu in 1908 for strengthening labor pains. Although its effect is marked, it is transitory. The action of pituitary extract is specific for the uterus; whereas that of adrenalin is specific for the circulatory system. Adrenalin is highly toxic; pituitary extract even in very large doses is nonpoisonous. Pituitary extract does not produce glycosuria, and does not produce arteriosclerosis as adrenalin may do. Pituitary extract contracts the coronary arteries; adrenalin dilates them. Pituitary extract dilates the renal arteries and increases diuresis. Adrenalin contracts the renal arteries and diminishes the diuresis. Adrenalin acts on the sympathetic; pituitary extract on the autonomic system.

Ergot.—Pituitary extract sensitizes the uterine muscle and causes it to respond to slight stimuli; ergot increases the force of contraction. Pituitary extract shortens the interval between the contractions; ergot does not, but strengthens the individual contractions.

Histamin.—Histamin is a synthetic preparation, but is also found in certain clinical conditions in the feces as a by-product of protein metabolism. It resembles, in small doses, pituitary extract in its action on respiration and blood pressure, but in larger doses it acts as a violent poison. However, by previously administering pituitary extract, toxic doses of histamin can be injected with little effect on respiration and blood pressure. The effect of pituitary extract is also weakened by previous injection of histamin.

It is possible that in those conditions where the uterus fails to

respond to an injection of pituitary extract, this may be due to an absorption of histamin from the intestinal tract. It is also probable that the toxemias caused by the entrance of histamin into the circulation might be benefited by the use of pituitary extract.

Anesthetics and Opiates.—These preparations are antagonistic to pituitary extract so far as this action on the uterus is concerned and *vice versa*. Their paralyzing effect is diminished by the administration of pituitary extract; on the other hand, excessive irritability of the uterus may be controlled by the use of any of these preparations. In this respect the opiates seem to exert a stronger influence than the general anesthetics.

SUMMARY.

The action of pituitary gland on the blood pressure, respiration and uterus is clear and certain; its close interrelation with the other glands of internal secretion is evident; its profound influence on metabolism and growth cannot be doubted; it would even appear to be essential to the organism in overcoming infection. But how it exercises its influence, what rôle its various constituents play in the human economy is still unsettled. What we know fairly well is its action on blood pressure, respiration and uterus. These actions have been found to depend, in various degrees, on each of the four substances obtained from the posterior lobe. What influence is exercised by the other substances found in the posterior lobe, we cannot at present tell. The constituents of the anterior lobe have not as yet been isolated. To determine the active principles it will be necessary to administer each of the constituents separately and combined, for prolonged periods on various classes of normal, hypophyzed, thyrodectomized and ovariectomized animals, and to apply the experimental findings to clinical observations.

CONCLUSION.

Pituitary extract, like any other therapeutic agent, must be used with discretion and judgment. With increased experience in the use of the drug the results should steadily improve. The use of the preparation is safer than any operative procedure in obstetrics. There is no specific in the entire field of medicine that gives 100 per cent. of perfect results, and it would be unreasonable to expect such results from pituitary extract; but in properly selected cases and in proper dosage, it is almost always effective.

In view of the fact that every operative interference in obstetrics

is associated with an increased mortality and morbidity, we would be justified in laying down a rule that no forceps, no pubiotomy, no Cesarian section in the lesser degrees of pelvic contractions, no forcible dilatation of the cervix should be performed without previous trial of pituitary extract. By the use of this preparation we are enabled to size up the situation. We gain a view into the relation of the expulsive powers to the resisting forces, and what chance the former have of overcoming the latter. As the third stage of labor is always shortened by the use of this preparation, no Credé or manual separation of the placenta should be attempted without a trial of pituitary extract. As the preparation causes a marked improvement in the tone of the uterus and the loss of blood during labor is thereby decreased, no condition that predisposes to atony, such as hydramnion, should be treated without pituitary extract. Because danger of infection increases with the prolongation of labor, pituitary gland should be administered even in normal cases where progress is slow or the pains are weak and infrequent. Metrorrhagia in lying-in period, foul-smelling lochia, retained membranes, should be treated by the use of pituitary gland in combination with ergot.

Choice of Preparation.—The following preparations have been placed on the market: 1. Pituitary extract (Burroughs, Welcome & Co.); 2. Pituitrin (Parke, Davis Co.); 3. Pituglandol (Hoffman-La Roche); 4. Hypophysis, concentrated (Freund & Radlich); 5. Pituitary liquid (Armour & Co.); 6. Hypophysin (Farbwerke Hoechst); 7. Glandiutrin (Richter); 8. Pituitary extract (Schering).

I have used all of the above-mentioned preparations except glandiutrin (7), but the major part of my observations is based on my experience with pituitrin. At first pituitrin (2) was furnished to us in ounce bottles, but the preparations would deteriorate on long exposure to air. Now the various preparations are put up in 1 c.c. ampules. Originally 1 c.c. of the liquid was equal to 0.1 gram of the fresh gland, now it has been concentrated to equal to 0.2 gram of the gland. Boiling does not injure the preparation, but contamination with alcohol does.

Pituitrin (2) is an active, good and reliable preparation. Pituitary extract (1) is a more concentrated and stronger preparation. Pituglandol (3) and Pituitary liquid (5) seem to be weaker than either of the above-mentioned preparations. I have found that Hypophysis (4) exerts no action either on blood pressure or uterus. Pituitary extract (8) seems to exert slight if any action on the uterus. Of late I have been using Hypophysin (6) with satisfaction.

I am indebted to my teacher and former chief, Prof. Wertheim of Vienna, for the splendid facilities I had at his clinic while making a study of the subject; to Dr. Ratnoff, Attending Surgeon at the Jewish Maternity Hospital for the material from his service placed at my disposal, and to Drs. Carch and Rosen, House Surgeons at the Jewish Maternity, and Dr. Yadkofsky, House Physician at the Sydenham Hospital, for careful notes and observations of patients under their respective charge.

107 WEST ONE HUNDRED AND EIGHTEENTH STREET.

TRACHELOPLASTY, A NEW OPERATION FOR THE RELIEF
OF STERILITY DUE TO STENOSIS OF THE CERVIX
UTERI.*

BY

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(With one illustration.)

A STUDY of the tissues involved, after the operation of dilatation of the cervix uteri for the cure of sterility dependent upon a stenosis of that structure, revealed the fact that usually within a few weeks of the operation, the cervical endometrium had undergone so marked an hyperplasia that the walls of the cervical canal were in direct apposition to each other, the individual cells of the mucosa in many instances intermeshed. In order to overcome this blocking of the canal and to insure its remaining patulous without the use of some form of stem pessary the operation of tracheloplasty was devised.

The procedure depends upon the excision of a portion of the cervical endometrium and its replacement with a strip of mucous membrane covered with flat squamous epithelium and derived from the mucosa of the posterior vaginal vault.

The operation in detail is as follows: Under ether anesthesia, the cervix is dilated to fully one and one-half inches with the Goodell dilator and the uterus curetted or not as the indications demand. A strip of the cervical mucosa 1 centimeter in width is then removed from the center of the posterior lip of the cervix and extending from the internal to the external os. The entire thickness of the mucosa is to be removed, down to the muscularis, and the edges of the denudation are to be smooth and regular.

The cervix is now drawn upward out of the way and a strip of

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mucous membrane is cut from the posterior vaginal vault, the top of the strip corresponding to the upper attachment of the vagina to the cervix. The vaginal strip is cut to fit the denudation in the cervical canal, and the lower margin is left attached to the vagina for purposes of nutrition. The resulting denuded area in the vaginal vault is drawn together by interrupted catgut sutures and the defect closed. The strip of vaginal mucosa, free except for its lower extremity, is then inserted into the canal previously cut in the posterior cervical wall and fastened in place by a few interrupted sutures of fine catgut, and the operation is complete.

From five to seven days later, when the vaginal insert has become closely adherent to the tissues of the cervix and its nutrient blood

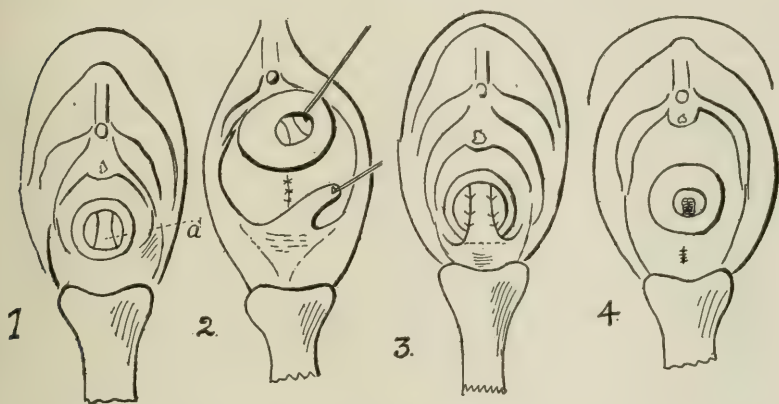


FIG. 1.

1. The gutter (*a*) cut from the posterior cervical lip.
2. The cervix held aside and the vaginal strip detached, with the defect closed.
3. The vaginal mucosa implanted into the gutter cut in the cervix.
4. The completed operation.

supply is well established, the narrow band connecting the vaginal strip with the vaginal floor is severed with scissors and any redundant tissue trimmed away. The end result is a cervical canal having in its posterior wall a gutter of mucosa covered with flat squamous epithelium, which permits the free ingress of spermatozoa no matter how great the degree of cervical spasm or stenosis may be.

The obvious advantage of this procedure is, that the hyperplasia of the cervical mucous membrane is checked at the posterior cervical wall by the presence of the strip of squamous epithelium, which latter acts almost like an autogenous stem pessary in maintaining the permeability of the cervical canal. It is surgically simple of

performance, nonmutilating and not attended by any danger of infection to the endometrium or tubes. The various steps of the operation are shown in the accompanying illustration.

348 SOUTH FIFTEENTH STREET.

A CASE OF REMOVAL OF BOTH BREASTS, WITH
SUBSEQUENT PREGNANCY AND ENTIRE
ABSENCE OF LABOR PAINS.*

BY

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THE close relation between the female breasts and pelvic organs has always been recognized. The changes which occur in the mam-mæ after conception, and the behavior of the uterus when the new-born babe is put to the mother's breast are phenomena familiar to every physician. This relationship was formerly thought to be purely nervous, *i.e.*, reflex in character. Now we believe another factor enters into the problem. As long ago as 1896 Dr. Robert Bell of Glasgow read a paper at the meeting of the British Gynecological Society in which he cited a number of cures of fibroid tumors of the uterus by the administration of mammary gland extract; in explanation of which he says: "When disease has taken possession of a structure, there must have previously existed an enfeebled condition of the parts affected, or possibly a weakened or faulty action of a distant organ, upon which that immediately affected is dependent for its healthy activity, either due to some reflex or other action which is not quite understood." He thus shows that the concept of an internal secretion, if it had not yet taken definite shape, was certainly present in his mind. His paper was the first, so far as I know, to demonstrate clinically the value of what we now regard as an internal mammary secretion, and following it a considerable literature grew up in this field. While internal secretions came to be recognized entities, the shorter term, hormone, was not introduced into medical literature until about ten years later by Starling.

The action of this mammary hormone in cases of fibroid uteri was found to be almost identical with that of ergot, that is, it causes contraction and shrinking of the uterus and tumors.

That it also has ecboic properties has been shown by Adler (*Münchener Medizinische Wochenschrift*, 1912, No. 1), who by the injection

* Read before the Philadelphia Obstetrical Society, May 7, 1914.

of the substance into guinea pigs, caused the immature ovum to be expelled without injury to the parent. This proposition is given negative support by an experience of peculiar interest which has lately come to my notice.

Mrs. R., aet. thirty-six years, had her right breast removed in 1910 for cystic degeneration, and her left breast removed for a similar condition in 1913. These breasts were very painful and with distorted and retracted nipples, but without axillary involvement. An uncle died of cancer, and a cousin had both breasts removed for cancer. Her periods were regular, lasted two or three days, and were painful. She menstruated normally, the second week in February, 1913, and in March, a month later, for one day only. In May when the left and remaining breast was removed, she was known to be pregnant, and the date of delivery calculated to be not later than the middle of December. The period of gestation was uneventful, but when the time for its termination arrived, the patient did not fall in labor. She had been married nineteen years, and had given birth to three children, aged seventeen, fifteen and twelve years respectively. These labors had all come on time and were difficult, but not instrumental. After waiting about four weeks beyond the expected date, *i.e.*, until January 14, I concluded to induce labor, and for this purpose introduced into the uterus an ordinary rectal tube, a procedure which has not failed me in any other instance. However, in this case no pains resulted, and after the tube had been in for a period of about forty hours, there was some bleeding and an offensive discharge; so I called an assistant, who administered an anesthetic, while I dilated the os manually and delivered the baby with forceps. She had been given an injection of pituitrin without effect before the forceps were applied; but I am quite sure this was because the drug had lost its virtue from age. The placenta was expressed in the usual way, and was immediately followed by more than the normal hemorrhage. A teaspoonful of ergot was given as soon as the placenta was delivered, and half this amount at two hour intervals thereafter for a considerable period. The activity of the drug was shown by pain following each dose, but in spite of the medicine the lochia continued much too copious. After three or four days, mammary extract was given instead of ergot, and with like effect, namely, uterine cramps, expulsion of clots, and lessening of the bleeding. After a week, during which the patient had lost an excessive amount of blood, the hemorrhages subsided and the lochia became more normal in appearance and amount, and the patient got out of bed at the end of the second week much reduced in color and strength. Ten weeks after the birth of the baby, examination showed the cervix to be lacerated, slightly enlarged and boggy, the fundus about normal in size and freely movable. She has some leucorrhœa which is growing less. She has not menstruated since the birth of the baby which is a healthy infant. After previous babies she had her sickness promptly and regularly every month after getting out of bed. Perhaps the excessive loss of blood after

labor is responsible for the delay in the return of the menstrual function. She is naturally of a full-blooded habit and florid complexion. April 14, three months after the birth of the baby, menstruation returned with backache, dizziness, and some pain, and during the four days which it lasted, she lost as much blood, to use her own doubtless exaggerated language, as she would formerly in twelve months.

To recapitulate, the patient had her only remaining breast removed shortly after becoming pregnant. Labor did not come on at the expected date, nor for a month thereafter. The usual method of inducing labor failed to start pains, and after instrumental delivery the uterus remained flabby and relaxed, except when under the influence of ergot or mammary extract, and finally her first menstrual period following labor was marked by an excessive flow of blood.

This experience checks up in a negative way the findings of those pioneer employers of mammary substance, who used it to contract enlarged and fibroid uteri, by showing that its absence results in a condition analogous to that for which they gave the drug.

A CASE REPORT ILLUSTRATING CERTAIN DANGERS IN THE USE OF THE INTRAUTERINE STEM.¹

BY

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THE frequency with which this little instrument is used at the present day and the steady increase in the number of its advocates renders the above question one of much importance. I have personally avoided its use until recently feeling that the procedure was not founded upon correct surgical principles, in that a foreign body was left in the uterine cavity for a considerable period, and that therefore the risks of infection could not be negligible. But the ease of its use, compared with the other means at our disposal, together with the fact that a number of my professional friends have been using this method for a considerable number of years with decided satisfaction, induced me to adopt it. I therefore employed it in a number of cases with perfectly satisfactory results and had come to feel that I had been foolish in having avoided it previously, when I met with the catastrophe to be detailed.

Some time ago a patient suffering from a moderate amount of dysmenorrhea and sterile after several years of married life applied

¹ Read before the Philadelphia Obstetrical Society, May 7, 1914.

to me for advice. According to my universal practice I told her that I was unwilling to subject her to any form of treatment, unless her husband submitted to an examination by a competent genito-urinary surgeon, to determine the possibility of procreation. To this her husband gladly consented and received a perfectly satisfactory report as to his condition in this regard.

The patient was therefore admitted to the hospital and was examined carefully under ether. The uterus was acutely anteflexed and mobile; it was not enlarged, but was well developed. The ovaries were probably a little smaller than usual, but there was not the least suggestion of any infection either recent or old. Cervical dilatation and a very gentle curettement were therefore done and the stem pessary was inserted. A Smith-Hodge pessary was also introduced into the vagina in order to hold the cervix well backward thus retaining the stem without stitches. The convalescence was absolutely without incident for the first two weeks, at the end of which time the patient left the hospital. One week later I was sent for because of an attack of pain, which she was experiencing in the right lower quadrant of the abdomen. The temperature was found to be 103 and the pulse 120, with slightly quickened respirations. There had been and were still some decided chilly sensations, but no actual rigor had been experienced. The face was suffused and pains were complained of in the limbs and back. Until an abdominal and a combined examination had been made I treasured the hope that I should be able to refer her to some friend skilled in the treatment of pneumonia or influenza, but these investigations made me very suspicious that I had a pelvic infection to deal with, as there was a most sensitive uterine body and in addition an acutely sensitive right lateral fornix. Moreover there was a condition, which the older writers were fond of recording but which is not so often the subject of note at the present day, namely a greatly increased sensation of vaginal heat over the normal. As the appendix had been removed at a previous operation there was no question as to its participation.

In questioning the patient as to her history subsequent to her discharge from the hospital, which as has been mentioned covered one week, I elicited the fact that she had had one intercourse and that, while she had bought a new douche in order to be sure of avoiding infection, she had, nevertheless, regularly diluted the hot water with cold water from the tap. The pain was so severe that two hypodermic doses of morphia each containing 1/6 grain had to be given during the night. Ice was kept constantly applied to the lower

abdomen and the temperature fell rapidly until it reached normal at the end of forty-eight hours. Pulse and respirations also decreased with the temperature fall and the pain was almost negligible. There was, however, still quite a marked amount of tenderness. There had been no abdominal rigidity up to this time.

For the next few days the condition remained the same as far as the pulse and temperature were concerned and there was a lessening of the tenderness. Shortly after the initial rise of temperature, at which time the stem was removed, there began to be a profuse darkish discharge and this continued for several weeks. Because of a mild attack of indigestion the patient was ordered calomel in divided doses and a small amount of magnesium citrate. As a result the bowels were moved without pain and the woman expressed relief from the headache and pyrosis which had been annoying her, but on my visit the next day, I received the report that there was a little more pain and on examination I found that the abdomen was not only more sensitive but also that the area of tenderness was now not limited to the right side, the left lower quadrant being now exquisitely tender. The temperature rose quite rapidly and the pain became much worse than during the previous attack. There was now rigidity, slight distension, marked prostration, some nausea, recurrence of chilliness and persistence of the thin purulent leucorrhœa which had now become quite profuse. Under ice locally, the Fowler position, enteroclysis, and withdrawal of all food for three days, the patient gradually improved and seemed safe as far as life was concerned but examination showed a mass in the left fornix apparently the size of a lemon though so acutely sensitive that its actual size and relations could only be approximated. The uterus seemed fixed. The right adnexa was sensitive but to a much less degree than the left.

The subsequent history of this case is that which was to be expected, namely, abdominal section and removal of the adnexæ. I was able to save the major portion of the left ovary and about two inches of the tube on the same side. There was no pus, either in the connective tissue or in the tubes, but they were distorted and bound down and the abdominal ostiæ were obliterated. The right ovary was enlarged to the size of a good sized orange by a cystic degeneration containing a bloody fluid. The convalescence has been uneventful.

In a word, a healthy young woman with pelvic organs entirely normal, as far as could be ascertained short of actual inspection, whose only complaint was a relatively slight indisposition for a few

hours each month, and whose reason for applying for treatment was moreover not the painful menstruation but the desire for children, has been, after a minor operative procedure, left in a condition of inflammatory adnexal trouble which has demanded a serious operative intervention for its relief, while the necessary mutilation probably precludes the possibility of future pregnancy.

I am aware that the whole question depends upon whether this case was free from infection before the introduction of the stem, since we are all in accord that in any case of latent infection this method of treatment has no place, and with a realization of the importance of the statement I am certain that there was no pathological lesion overlooked in this case.

As I have previously stated, I have never been enthusiastic about this procedure and have not used it until within the past year, since I felt that an accident, such as the one portrayed here was easily possible, and therefore in these cases, I have always been on my guard to detect any departure from normal pelvic conditions. I remember distinctly examining this patient under anesthesia before dilating her, and am as certain as it is possible for me to be that there was no gross pathology undiscovered. The position that it is impossible to be sure of the absence of infection by any examination, and therefore that there may have been an undiscoverable focus of infection somewhere in the pelvis, falls by the weight of the daily experience of all those active in this department of surgery. How often at the present day does pelvic infection follow the plastic operation or curettement. If there be a doubt the abdomen is opened after the plastic has been performed. In other words, it is certainly possible to separate the doubtful and the evidently pathological from the clean case by considering, as was done in this instance, the history and the results of a careful pelvic examination under anesthesia.

This being the case we are confronted with the question as to the possibility of infection at the time of operation. Again the appeal must be made to the universal experience of all competent operators working under good conditions of hospital environment. How often do we see infection of the uterus and adnexæ follow dilatation and curettement? The answer is obvious. It must be remembered, however, that the introduction of a stem allows a chance for introduction of sepsis which is not found in the ordinary plastic on the uterus, since in the one case the whole operation is completed at one sitting while the stem remains in the canal for weeks. In other words, I believe that ascending infection, plus the pressure and fric-

tion of the distal end of the pessary against the uterine wall, is the explanation of the evil results in the case herein reported and that the infection in this case occurred subsequent to the discharge of the patient from the hospital. There were two ways in which this could have occurred, first, by the sexual act which as has been noted occurred once, and secondly, by the medium of the nonsterile douches which were taken daily by the patient for one week after her discharge.

With regard to the first of these possibilities, namely infection from intercourse, it is to be remembered that the husband had been examined by a very competent genitourinary surgeon and pronounced in good physical condition just previous to the introduction of the stem, and this in conjunction with the fact that they had been married for years and that the patient had never before had pelvic trouble of any sort, precludes a preexisting gonorrhoea. It is of course possible that the husband might have contracted the disease while the woman was in the hospital and with this point in mind I asked him to submit to another examination, with the result that he was found to be free from any evidences of gonorrhoea either recent or remote.

There is of course one other manner of infection by intercourse, namely, by the introduction into the vagina of organisms upon the penis. Such a contamination of the male organ may take place either from dirty personal habits or more likely from the vulvoperineal region of the woman. I admit that this last may be considered as a fanciful method, but it has been considered of enough importance in obstetrics to suggest the abrogation of the sexual act during the last few weeks of pregnancy. If it be remembered that the cervical canal after the stem has been introduced is in a more patulous condition than at any other time except after delivery it appears that the remote possibility of such an avenue of infection cannot be lost sight of, particularly in view of the fact that an examination after several days will show the stem loose in the cervix so that it does not seem impossible that infection might travel up along the stem.

With regard to the nonsterile douches administered daily for a period of six days there is only this to be said, namely, that there was probably more chance of forcing infection into the uterine cavity by this means than by the act of intercourse since, the vagina being nulliparous, it was of course capable of retaining an appreciable amount of water under a pressure, which would, in the presence of a

dilated cervix, easily force it into the uterine cavity alongside the stem.

I have been interested in this case, as is but natural, and for the purpose of coming to some conclusion I have asked several of my friends in the profession for their experience in regard to this operative procedure. By these means I have collected three hundred and eighty-seven cases upon whom this procedure has been carried out. This number, it must be understood, is only an approximation as the greater number of these gentlemen were not in a position to give exact figures. It seems more fair therefore to place the total number of cases at four hundred. In this list there were twelve cases of infection noted. Leaving out four cases which were designated as mild and which were not followed by any known serious pathology, demanding operative treatment for their relief, we have remaining eight cases in which there were subsequent mutilating operations necessary for the relief of pathology supposedly produced by this harmless little instrument. It is begging the question to advance the opinion that these eight infections are due to mistakes made in their selection for this operation, since all the men who have contributed to this list are skilled specialists in this branch of medical practice and, as their work proves, are not in the habit of missing latent infection when making pelvic examinations. Moreover it is to be noted that while I have increased the total of the cases in this series, over the actual figures as estimated by my correspondents, I have, on the other hand, assumed that the number of known infections comprises all that actually occurred, which in my opinion is very likely not the case, since a large proportion of these women were members of the dispensary class and in many instances disappeared from the knowledge of the surgeon immediately after discharge from hospital. In other words I believe that it is very conservative to reckon the number of those infected in this small series of cases as eight in four hundred. When it is remembered that all these women may be truthfully assumed to have been clean cases, and for the reasons above stated I submit this as a fact, that they applied for the relief of a nonpathological condition and one which in no way affected their life or even their health, and that as a result of this minor operative intervention they were placed in danger of death and that in probably all of them the last chance of child bearing was taken away, it certainly seems a pertinent question as to whether this method of treatment is as safe as one would be led to suppose by the claims of certain adherents. I do not question the developmental changes in the uterus, the result of the use of this

nessary; I do not question that pregnancy has followed in a proportion of cases fully as large if not larger than after other methods of treatment, though I know that there are those who question both of these statements, but I do believe that the dangers of this procedure have not been realized by a number of its enthusiastic advocates. To call attention to the inherent danger is the reason for the presentation of this paper.

THE TOTAL NONPROTEIN NITROGEN OF THE BLOOD
IN THE TOXEMIAS OF PREGNANCY.*

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AND

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In a recent article (1) on this subject we reported our findings in a series of twenty pregnant women. The study has been continued and we now add five normal cases and fifteen cases which show some renal change or toxic symptoms during pregnancy. The method employed was that of Folin(2), and in a few instances we have determined the results by titration as in the Kjeldahl method, in addition to using the Dubosq colorimeter. This modification, while satisfactory in the nitrogen determinations, is less so for the ammonia-urea fraction owing to the smaller quantity present.

The cases studied in both our investigations have been classed in four groups:

Group A. Twelve cases, normal pregnancy or puerperium. In these the total nonprotein nitrogen expressed in milligrams per 100 c.c. of whole blood ranged from twenty to thirty, and the ammonia-urea fraction from 6 to 10 mg. The results in this group follow:

Group B. Eleven cases, pregnancy with renal symptoms. Among these are several which might be classed as preclampsics and others as cases of kidney of pregnancy. In two valvular heart disease was a complicating factor and was associated in one instance with jaundice and stupor. In this series the total nonprotein nitrogen ranged from 29 to 52 mg. per 100 c.c. of whole blood and the ammonia-urea fraction from 7 to 30 mg. The results in this group follow:

Group C. Thirteen cases, eclampsia. The convulsions in these cases varied in number and severity, some cases having convulsions during a period of many hours, while in one individual but one con-

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TABLE I.—GROUP A. NORMAL PREGNANCY OR PUERPERIUM.

No.	Age	Para	Month of pregnancy	Nitrogen, mg. per 100 c.c.	Urea, mg. per 100 c.c.	Blood pressure	Edema	Albumin	Casts
1	22	II	5	20	6	120	None.	None.	None.
2	27	II	9	23	10	140	None.	None.	None.
3	21	I	9	25	8	125	None.	None.	None.
4	25	I	7	27	14	125	None.	Trace.	None.
5	27	IV	7	30	13	130	None.	None.	None.
6	16	I	9	28	14	130	None.	Trace.	None.
7	19	I	8	27	10	140	None.	Trace.	None.
8	19	I	9	19	.....	115	None.	None.	None.
9	24	I	18 days postpartum	25	14	120	None.	None.	None.
10	36	V	14 days postpartum	29	.....	110	None.	None.	None.
11	20	I	13 days postpartum	30	6	95	None.	Trace.	None.
12	22	I	8 days postpartum	21	9	110	None.	None.	None.

TABLE 2.—GROUP B. PREGNANCY WITH RENAL SYMPTOMS.

No.	Age	Para	Month of pregnancy	Nitrogen mg. per 100 c.c.	Urea, mg. per 100 c.c.	Blood pressure	Edema	Albumin	Casts	Remarks
1	37	I	5th	33	16	175	Marked.	Heavy cloud.	Present.	
1	.....	.....	10 days postpartum.	29	.....	160	Slight.	Trace.	Present.	
2	39	II	9th	52	30	204	Moderate.	Light cloud.	Present.	
2	.....	.....	14 days postpartum.	29	7	195	None.	Trace.	None.	
3	20	I	9th	35	11	165	Moderate.	Heavy cloud.	None.	Valvular heart disease.
4	22	I	6 days postpartum.	30	8	150	Moderate.	Light cloud.	None.	
5	32	VII	9th	41	16	170	Moderate.	Heavy cloud.	None.	
6	21	II	9th	42	22	230	Moderate.	Heavy cloud.	Present.	
7	30	I	Del. at 7 mos. 5 days postpartum.	42	21	190	Slight.	Light cloud.	Present.	Retinitis.
8	20	I	1 day postpartum.	35	15	160	Marked.	Light cloud.	Present.	
9	30	II	8th	33	22	170	Moderate.	Light cloud.	Present.	
10	19	I	8th	30	10	175	Marked.	Heavy cloud.	Present.	
11	35	X	8th	33	.....	125	Slight.	Light cloud.	Present.	Valvular heart disease, jaundice, stupor.

TABLE 3.—GROUP C. ECLAMPSIA.

No.	Age	Para	Month of pregnancy	Nitrogen, mg. per 100 C.C.	Urea, mg. per 100 C.C.	Blood pressure	Edema	Albumin	Casts	Remarks
1	18	I	1 day postpartum	25	11	160	None.	Trace.	None.	Recovered.
2	24	II	9th	37	25	195	Moderate.	Heavy cloud.	Present.	Died, pneumonia.
3	29	III	1 day postpartum.	40	27	210	Slight.	Heavy cloud.	Present.	Died, moribund on admission.
4	23	I	1 day postpartum.	46	30	162	Slight.	Heavy cloud.	Present.	Recovered.
4	.....	.....	14 days postpartum.	35	14	140	None.	Trace.	None.	Recovered.
5	19	I	9th	54	.....	165	Marked.	Boiled solid.	Present.	Recovered.
5	.....	.....	11 days postpartum.	25	11	140	None.	Light cloud.	None.	Recovered.
6	30	I	7th	51	22	210	Slight.	Light cloud.	Present.	Recovered.
7	29	I	6th	72	50	180	Marked.	Light cloud.	Present.	Died, mania.
8	24	III	8th	32	12	135	Slight.	Trace.	None.	Nephritis, previous pregnancy, recovered.
9	26	I	9th	32	17	120	None.	None.	None.	Recovered.
10	20	I	9th	33	19	175	None.	Boiled solid.	None.	Recovered.
11	22	I	9th	39	17	130	None.	Light cloud.	Present.	Recovered.
11	.....	.....	14 days postpartum.	25	10	115	None.	None.	None.	
12	26	I	1 day postpartum.	36	16	145	Marked.	Light cloud.	Present.	Recovered.
13	42	VII	7th	40	13	250	Slight.	Boiled solid.	Present.	Recovered.

TABLE 4.—GROUP D.

No.	Age	Para	Month of pregnancy	Nitrogen, mg. per 100 c.c.	Urea, mg. per 100 c.c.	Blood pressure	Edema	Albumin	Casts	Remarks
1	30	III	8	20	8	130	None.	None.	None.	Chorea.
2	24	II	3	22	8	116	Slight.	None.	None.	Pernicious vomiting.
3	18	I	2	26	5	115	None.	Trace.	None.	Pernicious vomiting.
4	32	II	8	23	11	160	Slight.	None.	None.	Hemorrhagic retinitis

TABLE 5.—RESULTS WITH PHENOLSULPHONEPHTHALEIN.

Group	Number	Diagnosis	Per cent. excreted 1st hr.	Per cent. excreted 2d hr.	Total
A	2	Normal pregnancy.	21	11	32
A	3	Normal pregnancy.	25	13	38
A	6	Normal pregnancy.	25	25	50
A	7	Normal pregnancy.	28	19	47
B	1	Pregnancy with renal change.	15	9	24
B	2	Pregnancy with renal change.	20	15	35
B	3	Pregnancy with renal change.	19	15	34
B	6	Pregnancy with renal change.	5	15	20
C	1	Eclampsia.	32	20	52
C	2	Eclampsia.	.....	.....	20
C	3	(Moribund).	0	0	0
C	4	(Eclampsia).	35	20	55
C	5	(Eclampsia).	20	3	23
C	5	Eclampsia with recovery.	25	20	45
C	6	Eclampsia.	20	18	38
C	10	Eclampsia.	25	30	55
C	12	Eclampsia.	10	10	20
D	1	Chorea.	30	10	40
D	2	Pernicious vomiting.	50	18	68

vulsion occurred. In this group the total nonprotein nitrogen varied from 25 to 72 mg. per 100 c.c. of whole blood, and the ammonia-urea fraction varied from 11 to 50 mg. The results in this group follow:

Group D. Four cases, one of chorea, one with hemorrhagic retinitis, high blood pressure, and headache but with normal urine, and two cases of pernicious vomiting of pregnancy. In the two cases of pernicious vomiting the total nonprotein nitrogen and ammonia-urea fractions appear practically normal and are for this reason worthy of note when compared to the derangement of the nitrogen of the urine seen in this condition. The results in this group follow:

In a number of the cases thus grouped the elimination of phenolsulphonephthalein was also estimated. The results are at variance in several instances with the other urinary examinations, the blood pressure readings and the clinical symptoms. This experience is in accord with that of other investigators. The results with phenolsulphonephthalein follow:

Conclusion: As a rule the total nonprotein nitrogen of the blood does not exceed 30 mg. per 100 c.c. of the whole blood in a normal pregnancy. In those pregnant women who have renal changes associated or not with toxic manifestations, as convulsions, there is usually a slight and in most cases a definite increase in the total nonprotein nitrogen. But the increase bears no relation to the severity of the symptoms. This degree of retention corresponds to that seen in parenchymatous nephritis as shown in the work of Farr and Austin(3). The amount of phenolsulphonephthalein eliminated varies so with the clinical picture that the use of this test does not appear to be of much value either as a diagnostic or prognostic aid in the toxemias of pregnancy.

We are forced to conclude that the close observance of clinical phenomena, the estimation of blood pressure and the examination of urine for albumin and casts are of greater importance than the use of either of the two newer methods we have employed.

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SCOPOLAMINE-NARCOPHIN SEMINARCOSIS IN LABOR.*

BY

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UNDERTAKEN rather in a spirit of skepticism, the present investigation was begun by us several months ago. Doubtless many others have shared our recent experience in being the recipients of inquiries on account of sensational articles in the lay press on "painless childbirth." The first attitude was naturally to ridicule the whole matter as preposterous and to recall the agitation on the subject among obstetricians in 1907 and 1908, at which time the method was tried and found dangerous. Many foreign observers, notably Steffens(1), Leopold, Hocheisen(2) and Veit(3) opposed it. It was also used for a time by many men in this country; condemned by some, faintly praised by others, but eventually abandoned by all. Newell(4) of Boston reported favorably on 112 cases in 1907. He later gave it up on account of the asphyxiated babies. Scopolamine-morphine narcosis in labor was tried by McPherson in 1908 at the Lying-In Hospital in New York, but proved exceedingly dangerous to the babies and also failed to produce results as far as the mother was concerned.

A few months ago in the columns of a magazine with wide circulation among American women, four professors of obstetrics in four of the most prominent medical schools in this country publish statements over their names denouncing scopolamine-morphin in childbirth. They claim respectively that its use is uncertain, dangerous and unsatisfactory; that it does not abolish pain in the small amounts used; and that the impressions received and opinions formed by them are decidedly unfavorable to the treatment.

There is nothing new in the use of scopolamine in obstetrics. Von Steinbuchel(5) in 1902 first suggested that it would be of value. The technic was further elaborated by Gauss(6) in Krönig's clinic at Freiburg, and in 1906 he published his first 600 cases. In 1907 and 1908 the literature contains several articles by Gauss(7), Krönig(8) and Mansfeld(9), describing the administration of the method in all the details mentioned by Krönig in 1913. Notwith-

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standing the good results claimed, Steffens and Hocheisen wrote strongly opposing its use after trial in 300 cases, and Leopold and Veit soon gave it up as dangerous. Frequent asphyxia and death of infants, with atonic postpartum hemorrhage and prolongation of labor, were the bad results reported. The final verdict was; first, the method did not accomplish the desired results, second, it could not be regarded as harmless for mother and child, and third, it was not to be recommended in private practice, as the by-effects liable to develop made it necessary that medical aid could be summoned at any moment.

Thus the subject had been dropped during the last six years by most obstetricians until last fall Krönig(10) again called the attention of the profession to its value. It is scarcely possible that the distinguished head of a reputable German clinic would presume to publish successful results of a method in over 3000 cases unless there was some virtue in it.

We are aware that an important factor in the increasingly difficult labors among more highly civilized and cultivated modern women is that they have not the strength to resist the nervous exhaustion caused by the appreciation of continued labor pains. To be sure it is possible by the administration of small amounts of ether, chloroform, or nitrous oxide, to make the actual delivery of the child practically painless. But the difficulty with such narcotics is that they cannot be given over a sufficient length of time to relieve the nervous exhaustion of labor without largely inhibiting its efficiency. Hence it seems justifiable to make another trial of the method in a series of cases, following more closely the technic of Krönig(11) and Gauss, provided there is no repetition of our previous bad results. We desire to see if we can secure anything like the results claimed by Krönig in Chicago last November. The question arises, can scopolamine when given in nonpoisonous doses have action adequate to produce appreciable relief in labor pains. It was entirely with an open mind that we approached the experiment, wishing to ascertain to our own satisfaction to just what extent we could condemn or extol the merits of the treatment. A phenomenon as interesting as the twilight sleep itself is that detailed descriptions of the technic such as have been followed closely in this study have lain idle in the literature for six years with no one taking advantage of them. Those who did make a trial of the procedure wandered far afield both in method and in the object to be obtained.

The crux of the proposition seemed to lie in three errors. First, most men in this country at least used a combination of the two

drugs, scopolamine and morphine, not only for the initial dose, but for the succeeding doses as well; second, the bad results were due also to excessive dosage, and to the use of unstable and deteriorated preparations of the scopolamine; and third, the erroneous notion prevailed that the method was to abolish the sufferings of labor, whereas it is intended only to prevent memory of the event.

The technic recommended by Krönig(10) and Gauss, and followed by us in the present series of cases is as follows. The treatment is not started until the pains are occurring regularly, every four to five minutes, and lasting at least thirty seconds, as determined by laying the hand on the fundus and noting its contractions. The outcry of the patient is no guide to the strength of her pains. Waiting for labor to be well established thus at once eliminates cases of so-called primary inertia from treatment. The first injection consists of 0.00045 (1/150 gr.) of scopolamine hydrobromide combined with 0.03 (1/2 gr.) of narcophin. Narcophin is a proprietary preparation of narcotine-morphine meconate, and according to Krönig gives better results than morphine and is less toxic. We have used both and find no marked difference in the result, but in order to follow the technic in detail we are using the narcophin. It is sold in this country in ampoules, ready for hypodermic use, and also in bulk. In the latter form it must be made up into tablets for use. Scopolamine doubtless varies greatly in its purity and therapeutic action. We used several preparations, and were finally fortunate to secure a supply of the "Scopolamine, Haltbar" prepared in sterile ampoules after the formula of Straub of the Freiburg clinic. Its advantage lies in the fact that it is a stable solution and carefully standardized. Three-quarters of an hour after the first injection a second injection is given consisting of 0.00045 (1/150 gr.) scopolamine alone. Thus far the dosage is empirical and standard. The further dosage varies for each patient, and depends entirely upon repeated tests of memory.

Besides its slight analgesic action in combination with small doses of narcophen, scopolamine has the peculiar quality of producing prolonged interruptions in the mental associations. Based upon this action the psychological test of the patient's memory is the most accurate guide to the dosage required in a particular case. Some women require much less than others. It is quite simple to keep repeating very small doses of scopolamine and get results as to complete amnesia. But herein lie the dangers of the method, asphyxia of the child, prolonged labor, and atonic relaxation of the uterus. It is most important to secure amnesia with the minimal dose for each

C. N.					Case No.
SCOPOLAMINE AMNESIA.					Division,
Name:					Date,
HOUR:					
INJECTIONS: drug amount make					
CERVIX:					
MEMBRANES:					
UTERINE CONTRACTIONS: a. frequency b. length c. strength d. onset bearing-down pains					
SUBJECTIVE SYMPTOMS: whether fatigue, thirst, nausea, pain in sacrum? in abdomen? in perineum?					
OBJECTIVE SYMPTOMS: sleep between pains, during pains, flushing, vomiting, twitching of hands, outcry, mental confusion, delirium.					
MEMORY OF OBJECTS: Retained or Lost.					
FETAL HEART: MATERNAL PULSE:					
DELIVERY: method anesthetic					
CONDITION OF BABY AT BIRTH PERINEUM: HEMORRHAGE:					

case. At Freiburg they have proved to their satisfaction that the quantity given must be regulated by the memory test, and Gauss insists that the success of the treatment stands or falls by the observations of this one test. Half an hour after the second dose the woman is asked whether she has had an injection, how many, and where; or if she remembers a watch, or some simple object that was shown her at that time. A note is made of her answer. Even if the memory is retained no new dose is given, but twice more at intervals of half an hour her memory is tested again. If the memory is still retained, a third injection of scopolamine, 0.0003 or less, is given. The third dose thus usually comes an hour and a half after the second. Further injections are given depending upon whether the memory is retained, dubious or lost. Abolition of memory is the result desired. It requires the nicest judgment to suit the test to the standard of the intelligence of a given case, especially in patients of the lower grades of mentality.

Frequent observations of the uterine contractions, the subjective and objective symptoms of the woman, the condition of the memory, the fetal and maternal heart rate, are noted and recorded on a suitable chart.

The patient is drowsy and sleeps lightly between her pains. When a pain occurs she manifests her suffering to a greater or less degree and again dozes. But consciousness is not entirely lost. She responds somewhat tardily to questions, and usually obeys commands as to change in posture or to an increase in her bearing-down efforts. The progress of labor must be more closely watched than usual, for the presenting part frequently is bulging the perineum without any increase in the apparent effort of the patient. This might be considered a disadvantage by those who are accustomed to judge of the advance by listening to the outcry of the patient from an adjoining room. The straining efforts as the head distends the vulva are not nervously augmented as in an entirely conscious patient. We have noted especially a more perfect mechanism and more regularly gradual escape of the head over the perineum, as attested by a distinct diminution of perineal lacerations. Whether this is the result of more perfect relaxation of the levator ani, or due to less tendency to reflex spasm thereof, remains to be proved.

Krönig lays great stress upon maintaining a condition of semi-unconsciousness, wherein the pains though apparently perceived are nevertheless immediately forgotten. The patient perceives a pain but does not apperceive it, in other words she does not appreciate it. At any rate on awakening she has no recollection of anything that has

occurred. The patient may complain that the treatment is not working and roundly abuse those in charge, yet half an hour after the birth have absolutely no recollection of her pains or of the coming of her baby even in cases in which no anesthetic is given. We find it a distinct advantage, however, to administer a few whiffs of chloroform or ether as the head escapes over the perineum. It is possible that this last pain may be so acute as to remain fixed in the patient's attention, and the whole treatment fail. One patient saw the accoucheur's hand covered with blood as he examined the placenta, and this was the only feature of her entire labor that remained fixed in her mind. It is important to reduce the sensory impressions as much as possible, hence isolation of the patient is necessary, the room is darkened and loud noises of any kind are avoided. Under disquieting conditions scopolamine induces excitement in the patient. At the time of actual birth the woman's face is kept covered, and the assistant occludes the patient's ears, or the cries of the child are muffled by the sound of running water. Thirty minutes after the birth of the child the woman is asked whether she has been delivered, and in the majority of cases she has actually no remembrance of the birth process and hesitates to believe that the child is actually hers.

The entire service of the Hospital is being utilized at present, and we are trying the method chiefly in primiparæ. Very early we found it necessary to select our cases, and it is perhaps in less than a quarter of all confinements at the Hospital that we are able to use it. Gauss was able to use the method in 70 per cent. of all cases, but a majority of our admissions come in so far advanced in labor that it is too late to start the treatment. We have found it impossible to get the patient under control of the drug after the onset of bearing down pains, and at present we are only using it in cases in which we anticipate a normal labor. We have to report our results in the first 100 cases, and for purposes of general comparison present brief statistics of the labors of an additional consecutive 100 primiparæ in which the scopolamine was not used. Krönig claims complete amnesia covering the duration of labor in 80 per cent. of cases. In our very limited experience in 100 cases we have secured complete amnesia in sixty-six women; and partial amnesia, hazy recollection with distinct alleviation of the patient's suffering in ten. Of the remaining twenty-four, twenty did not respond to the drug at all, and four were too far advanced in labor to derive any benefit. It is noteworthy that practically all of the successful cases were those in which the treatment was started three to seven hours before the terminations of labor. The percentage

of successful cases is increasing as we become more familiar with details of the treatment.

A study of the failures is of interest. In several the treatment was started too early. Labor had been in progress some hours but the uterine contractions were not sufficiently frequent or regular. Inertia developing, the treatment had to be abandoned. In some the second dose was given at too long an interval after the first. The majority of failures, however, were cases apparently quite suitable for the treatment, but though they dozed between pains, retained their memory perfectly throughout the duration of labor. In the majority of failures the maternal pulse did not go above 100 even with prolonged and excessive medication. One patient had 7/100 gr. of scopolamine during thirteen hours. She seemed to respond to the drug in every way, yet maintained her apperception of pain perfectly and the memory was retained at every test. If after three or four injections, amnesia is not obtained it is better perhaps not to push the treatment any further. In the majority of successes the maternal pulse rate was consistently elevated, and ranged between 100 and 130 when the patient was well under the influence of the scopolamine and full amnesia had been obtained. One patient developed a rapid weak pulse running between 140 and 160 for two hours after delivery, with active delirium, but with quiet and regular respiration. She was one of the successful cases and remembered absolutely nothing after the first injection. There is usually recollection of the pains that occurred before the treatment was started.

Involution of the uterus as observed by daily measurements of the height of the fundus proceeded normally. Many of the more intelligent patients expressed themselves as not feeling any more exhausted the day following than the day before the baby came, and several private patients who had previously read descriptions of the work at Freiburg were eager to get out of bed the first day. But we saw no reason to curtail the routine length of the lying-in period.

The disadvantages claimed by those opposing the treatment are chiefly two, fetal asphyxia and postpartum hemorrhage. It is evident that these objections are the result of improper technic. Our observations in 100 cases on these points are as follows: In the 100 primiparæ delivered without the use of scopolamine there were two instances of postpartum hemorrhage so profuse as to require packing, and moderate hemorrhage thirteen times. In our scopolamine cases there were two instances of rather severe hemorrhage, controlled without packing, and eight cases of moderate bleeding. In other words the tendency to hemorrhage seems to be less, rather

than greater. The two severe hemorrhages we encountered were cases in which pituitrin had been given more than an hour before delivery and were probably due to the atony from the wearing off of the effect of the pituitrin, as has been observed by Madill and Allan of the Rotunda Hospital.

As to the occurrence of fetal asphyxia; in the hundred delivered without scopolamine there were seven instances of asphyxia at birth, two of them requiring tubes and artificial respiration for twenty minutes. In the scopolamine babies the majority cried at once without any evidence of being under the influence of a drug, eight were moderately apneic, but responded promptly to flagellation and tubs, and two required artificial respiration for fifteen and twenty minutes. The asphyxia that occurred was in those cases where there was delay of the head on the perineum. Under the old technic the frequent severe fetal asphyxia was plainly due to the repeated doses of morphine. At present the initial dose of narcophin is well worn off before the baby is born. In rare instances with extreme restlessness of the mother it may be necessary to repeat the narcophin once in a very small dose. It is important not to do this in cases where delivery may be expected within two hours. There was one stillbirth in the untreated hundred and one baby that died in the first twenty-four hours. In the scopolamine series there were two stillbirths, and one death of a child of an eclamptic, twenty-four hours after birth apparently of a toxemia similar to its mother's.

One of the stillbirths occurred after forceps delivery on account of delay at the outlet for two hours with the cord around the neck, and one with an abnormally short cord tight around the neck. In both of these cases the fetal heart was heard distinctly and unchanged in rate twenty minutes before delivery. We feel these stillbirths were due rather to a faulty mechanism of labor and would have occurred the same without the administration of the scopolamine.

The average duration of labor in these hundred primiparæ was sixteen hours, as against eighteen hours in the untreated hundred. The third stage averaged thirteen minutes as against sixteen minutes in the untreated hundred. Hence there was no prolongation of labor. The average duration of labor after the first injection was six hours. In general, the effect on the course of labor was a rather more rapid dilatation of the cervix than usual, followed by a delay in the advance of the presenting part at the outlet and especially on the perineum. This constant delay on the perineum was rather disconcerting at first and resulted in an increase in the number of low forceps extractions until we began to use pituitrin, which obviated the use of forceps in

most of our later cases. In all there were seventeen forceps extractions, as compared with eleven in the untreated hundred primiparæ. Eight of these seventeen operations were done for arrest of the head at the outlet with strong pains, and would have been required in any case. Two low median forceps were done because of the fetal heart falling below 100. One of these babies was moderately asphyxiated at birth but promptly revived. Six were done for inertia with head at the outlet, and we would avoid these now with the use of pituitrin. One low forceps was done because of an intrapartum eclamptic seizure of the mother with the head on the perineum. As mentioned previously the perineal lacerations were greatly reduced in number owing to the slow escape of the head through the vulva. To this extent inertia with the head on the perineum may be said to be an advantage. There were forty-seven lacerated perineums in the untreated hundred primiparæ and thirty-six in the hundred primiparæ delivered under scopolamine semi-narcosis.

It thus appears that the few disadvantages of the treatment are ones that may be avoided by constant observation of the case. We count the fetal heart every fifteen minutes. The administration of the scopolamine and the memory test must be carried out with watch in hand and all the details of Krönig(10) and Gauss followed methodically to obtain the greatest number of successful amnesias.

Naturally the obstetrical side of the case is followed and managed exactly as though no scopolamine narcosis were being employed. Even closer attention than usual must be paid to the progress of labor and abnormalities promptly corrected as they arise.

And now as to the limitations of the treatment. In the ward service of a large hospital it is only in a fraction of the total admissions that the scopolamine semi-narcosis is feasible. The patients many times come in too far advanced in labor and often the resident staff are too busy to give the case the prolonged personal attention that is necessary.

On the other hand it is not only to be admitted but to be emphasized that the method is only a practical procedure for general practice in private houses when the finances of the patient permit the transfer of a complete working force to her room for the entire duration of labor. We tried eight cases in the tenement service with six successes, but the services of one or two attendants were constantly required throughout the course of labor and the remainder of the family was locked out.

We feel assured, however, that we have in this a valuable method of abolishing the woman's recollection of the ordeal of labor in from 60 to 70 per cent. of cases; and we believe in conscientious and

painstaking hands, by strictly adhering to the above described technic, that the possible dangers may be foreseen and avoided.

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THE USE OF SCOPOLAMINE IN OBSTETRICS.*

BY

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IN May of this year we decided to investigate the use of scopolamine in obstetrics. We were at that time fully aware of the various reports emanating from the different clinics, both in this country and abroad, covering a period of the last twelve years.

Steinbuchel was the first to use scopolamine in obstetrics and in 1902 cited his experience in a series of twenty cases. This report prompted Krönig and Gauss to make further investigations in order that they might thoroughly study this subject. In 1906 Gauss published the results of his observations in 500 cases, in which he used a combination of scopolamine hydrobromide and morphine to induce a state of semi-consciousness during labor. This mental state he termed "Dämmer Schlaf" (Twilight sleep). The studies of Gauss stimulated a general interest in the subject and very soon numerous articles from the various obstetric clinics appeared. Some, chief among whom were Krönig, Zweifel, Berute, Newell, etc., confirmed the work of Gauss, and credited to this method all that he claimed for

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it; others, especially Hocheisen, not only denied its efficacy, but even attributed to it elements of danger to both mother and child. Notwithstanding the adverse criticism brought forth, Krönig, Gauss and their co-workers at Freiburg adopted this procedure as a routine form of treatment. In 1907 Gauss published a second article reporting 1000 cases and in the spring of this year an extensive study covering a series of 5000 cases.

Before taking up the physiological action of scopolamine and morphine it would not be amiss to touch upon the physiology of labor pains and our aim to modify or alleviate these by the use of drugs.

We must differentiate between objective pain, by which we understand, uterine contraction and subjective pain, that which is experienced by the mother. Any method which has for its object the elimination of subjective pain, must under no circumstances interfere with objective pain.

It is a well-known fact that the pain caused by uterine contraction does not affect all women alike. Every experienced obstetrician has occasionally seen a patient in whom labor has progressed to a stage of complete dilatation without any physical evidence of pain. We must, therefore, conclude that the degree of subjective pain depends upon the sensitiveness of a given nervous system. It is equally well known that the degree of sensitiveness can be modified by the use of many therapeutic measures.

The central nervous system is the seat for the perception of pain. Impulses are conducted to and from it. The degree of pain depends both upon the ability of the cortex of the brain to receive and upon the nerve trunks to conduct. If by any method we are able to minimize either the perceptive power or the degree of conductivity, pain may be markedly diminished, or even entirely abolished.

From the above it may be seen that the progress of labor does not depend upon subjective pain and that this may be diminished or eliminated without interfering with the normal progress of labor. Labor essentially depends upon the degree of uterine contraction for its successful termination. The purpose and object of this method of treatment is primarily to obtain a mental state in the patient by which the receptive and perceptive powers are diminished without the complete loss of consciousness. Clinically this is best accomplished by the judicious use of the combination of scopolamine hydrobromide and morphine.

It is not my intention to discuss the various physiological manifestations produced by these drugs upon the central nervous system, for

I feel certain that their effects are too well known to all. I shall only attempt to call attention to the effects produced by these agents in their relation to obstetrics.

The action of scopolamine is chiefly upon the central nervous system. It quiets the cerebrum and diminishes the perception of pain, without apparently influencing the contractility of the uterus. Labor, therefore, may progress uninterruptedly and the patient may not only fail to recollect these pains but may even be entirely unaware of them.

Clinically these cases may be divided into three distinct groups: (1) Those patients in whom we obtain both amnesia and analgesia, that is abolition of memory and diminution of pain; (2) patients in whom we obtain analgesia without amnesia; (3) cases which entirely fail to respond to this treatment.

In order to obtain the best possible results with this method, certain cardinal requisites must be strictly observed. It is absolutely necessary that the patient is so placed that she is free from all disturbances. A physician or nurse should be in constant attendance. The effects of the drug should be carefully watched so that it is repeated at proper intervals. Light in the room should be so arranged that the patient is not disturbed by it. The fetal heart sound should be carefully studied. Solutions should be obtained from reliable chemists and should be accurately standardized. It should be perfectly clear, never having any sediment or flocculence, and should preferably be put up in ampules each containing the quantity required for a single injection.

In instituting this method of treatment, it has been my good fortune to obtain the services of Dr. K. Schlossingk who was one of the assistants in the clinic of Krönig at Freiburg.

For purposes of accurate statistics, special charts were printed, indicating the important points to be noted. Dr. Schlossingk assumed full charge, so that the technic followed by him was identical with that of Krönig and Gauss at Freiburg.

Our rule is to admit to the hospital only those patients who are in active labor. We, therefore, have no means of judging precisely when labor set in, and the average duration of the first stage.

Treatment is begun only when the patient shows definite signs of active labor. The patient is then put to bed in a dimly lighted room and an initial dose of 0.00045 gm. or approximately 1/160 grain of scopolamine hydrobromide is injected intramuscularly. This is preceded by a hypodermic injection of 1/2 grain of narkophen. The effects are now carefully observed with special reference to

pulse, respiration, pupillary reaction, fetal heart sounds and frequency and intensity of uterine contractions. A second injection of scopolamine is given about one hour after the first one. About one-half an hour after this injection memory tests are brought into play. The patient is shown some object, such as a doll or watch, and a short while later she is asked whether she saw the particular object in question. She may be asked whether she remembers having received a hypodermic injection. Any test of memory will do. The repetition of injections is now primarily gauged by the degree of amnesia present. The interval between injections is approximately 1-1-1/2 hours. The average normal case requires from five to seven injections, although at times it may be necessary to give only two or three or as many as twelve or fourteen.

At the completion of the first stage, with the presenting part on the perineum, 1 c.c. of pituitrin is usually given to hasten delivery. As soon as the child is born, the cord is quickly ligated and severed and the infant is removed to another room. The mother is made comfortable and usually falls into a deep slumber to awake two to four hours later often in complete ignorance of the fact that she has already given birth to her child.

When this treatment was first instituted, many difficulties were encountered. Being an experiment, with final results uncertain, we hesitated to inform our patients and therefore lacked their cooperation. Dr. Schlossingk was not quite familiar with our type of women, and consequently could not accurately gauge the dosage and intervals. For our solutions we had to depend upon a local chemist, who at best sent us preparations which quickly deteriorated. Our accommodations at that time were such that it was impossible to devote a special room to this work, the patients being treated on the regular delivery tables. As a result of these obstacles our results in the early cases were not too encouraging. We felt, however, that this method of treatment deserved a further trial. Arrangements were then made by which the treatment was carried out as near as possible to that described by Gauss at Freiburg. The percentage of successful cases immediately increased and it was now quite evident that this mode of treatment deserved all that Krönig and Gauss claimed for it.

Drugs.—The scopolamine used is that prepared by Hoffman, La Roche according to the method prescribed by Straub. This consists of the addition of mannite $C_6H_8(OH)_6$ to the scopolamine. This prevents deterioration of the solution, and therefore standardizes its physiological action.

Morphine and pantapone were used for a long time but their de-

pressing effects upon the respiratory center, chiefly in the child, led Staub to construct a synthetic opiate which he called Narkophen (morphine-narcotine-menconat). This preparation seems to have the same sedative action as morphine without the depressant effect on the respiratory center. Narkophen is prepared by Böhringer Sohne of Mannheim.

Our experience with this form of treatment consists of a series of 125 consecutive cases in the obstetric services of the Jewish Maternity and Lebanon Hospitals. As previously stated, our cases were subdivided into three groups with the following results: (a) 104 cases or 83.2 per cent. in which there was complete amnesia with analgesia; (b) nine cases or 7.2 per cent. in which there was analgesia without amnesia; (c) twelve cases or 9.6 per cent. in which the treatment failed to produce the desired effects.

We shall now attempt to emphasize those phases connected with labor and the postpartum period which are of special interest to the obstetrician.

Pain.—Pain is less intense and apparently of a shorter duration, for it is only the acme of the pain that the patient is probably conscious of. However, if closely observed, we find no alteration in the actual time of uterine contractions. Apparently the intervals between pains are lengthened, but in reality they are about the same. The outward manifestations of pain, such as facial expression and outcry are markedly diminished.

Duration of Labor.—Since our patients are admitted only when in active labor, we have no precise means of judging the duration of labor. The average duration of labor in primiparæ in this series, figuring from the time of admission to delivery, was eight and one-half hours. The average time that the patients were under the influence of scopolamine was about six and one-half hours. The longest period that a patient was kept under was nineteen hours. The shortest period was one and one-half hours. The average number of injections was five, the highest number was twelve, and the lowest, one.

Effects on Child.—One of the principal reasons advanced against this form of treatment was that many children were born asphyxiated with a resulting increase in the infant mortality.

We must distinguish between asphyxia and oligopnea, a condition which is often seen in babies delivered by this method. This condition is best explained by Gauss and Holtzbach. They believe it to be due to the fact that scopolamine depresses the peripheral filaments of the vagus (in intrauterine life) and when the child is born it requires a longer period to accumulate a sufficient quantity of carbon

dioxide to stimulate the respiratory center in the medulla. Clinically this is illustrated by the fact that scopolamine babies, when born in a state of oligopnea, breathe and sometimes cry immediately after delivery; following this there is a drop in the heart rate and the breathing becomes exceedingly shallow, and within the succeeding five to ten minutes the child gradually resumes normal respiration and good heart action. That this condition is not dangerous is best proven by the fact that these children do best when not interfered with, by any artificial methods of resuscitation.

In our series 102 babies, or 81.6 per cent., cried spontaneously. There were nineteen cases or 15.2 per cent. in which there was varying degrees of oligopnea present. There were four cases or 3.2 per cent. of asphyxiated children. The total infant mortality was three deaths or 2.4 per cent. One was a premature infant with spina bifida. The second died from neanatorium and the third from subdural hemorrhage.

Operative Procedures.—In our series, labor had to be terminated artificially in fifteen cases or 12 per cent. In two patients the breech presented and delivery was accomplished by bringing down a foot. In thirteen cases forceps was used; of these two were medium and eleven low. One case was nephritic with marked edema, and it was deemed advisable to terminate labor quickly. In three cases forceps was indicated because of persistent occipitoposterior positions. In one case labor was terminated because of an existing severe cardiac condition. In three cases labor was prolonged, the fetal head apparently meeting with some obstruction at the pelvic outlet. In six cases labor was terminated on account of a tedious second stage. In the last-mentioned cases, the perineum was bulging with caput showing and practically all that was necessary was extension of the head with the forceps blades. The instruments were then removed and labor allowed to terminate spontaneously.

Anesthetics.—In the most recent report by Ziegel of Freiburg in a series of over 200 cases ethyl chloride by inoculation was administered as a routine during the stage of expulsion. This is done in order to further obviate any recollections of pain.

It has been found that in order to carry out this form of treatment successfully, the patient must be constantly kept under the influence of the drug. Should she at any time during the course of the treatment partially regain consciousness, she will not only recollect the pain which she actually experienced, but will reconstruct the entire progress of labor. Such isolated periods of relative consciousness are termed by Gauss "Isles of Memory." These are most apt to

occur during the stage of expulsion. In our series we did not find it necessary to resort to the use of a general anesthetic for this purpose.

Ether was the anesthetic used where artificial delivery was performed. The use of chloroform for any purpose during labor was abandoned by us about three years ago. The patients were very quickly narcotized, taking the ether very readily and consuming very small quantities of it.

Contraindications.—With the possible exception of kidney complications, we find no contraindications for the use of this method. Zweifel even goes so far as to recommend it in eclampsia and reports three cases treated successfully.

Endocarditis was present in two cases with no untoward effects as a result of this mode of treatment. On the contrary we believe that this procedure is especially efficacious in labors associated with cardiac disease, for it tends to eliminate not only the mental anxiety but the actual physical strain induced by the patient's efforts to help labor along.

Convalescence.—It is interesting to note how little these patients are physically effected by labor. The exhaustion that usually accompanies labor in primiparæ is entirely eliminated. They usually appear very calm the following day, for instead of having passed the previous day in pain and wakefulness, they had gone through labor in a state of semi-consciousness without any undue physical exertion. There were ninety-two primiparæ in our series and in our experience this treatment is best suited to first labors.

We have also observed that the tendency toward engorgement of the breasts is notably diminished in these cases. This is probably due to the action of scopolamine on the peripheral secretory nerves.

Conclusions.—1. Standard solutions are absolutely essential for the success of this treatment.

2. No routine method of treatment should be adopted. Each patient should be individualized.

3. Facilities should be such that the patient is not unduly disturbed.

4. A nurse or physician must be in constant attendance.

5. This form of treatment is carried out in hospitals, although there is no reason why it cannot be accomplished in well-regulated private homes.

6. It does not affect the first stage of labor, but the second stage is somewhat prolonged.

7. Pain is markedly diminished in all cases, while amnesia is present in the greatest number of patients.

8. This treatment does not in any way interfere with any other therapeutic measures which may be deemed necessary for the termination of labor.

9. Fetal heart sounds must be carefully watched. Sudden slowing calls for immediate delivery when possible or the discontinuance of the treatment.

10. Oligopnea was present in 15.2 per cent. of cases. However, normal respiration was very soon established and no ill effects were observed.

11. No change in the course of the puerperium was observed and convalescence progressed very smoothly in our entire series.

Finally, judging from our observations and experience, we feel that this method of treatment should be given a fair trial. It is only a varied experience by competent men that will tend to settle this extremely interesting subject. It is the duty of the medical profession to set the public aright on this most important question. For our part we believe that this method of treatment robs the woman of the agonies of pain accompanying labor, and in addition instills within her a feeling of confidence which materially aids her to pass through this trying ordeal. We must approach this subject both from a medical and humane aspect. If pain can be relieved it is every physician's duty to do so, and no effort should be spared to accomplish it. The comparative safety with which this drug may be used in competent hands, not only justifies but compels every obstetrician to give this form of treatment a fair test, and convince himself as to its merits.

To condemn or advocate a given therapeutic measure without a thorough personal investigation is truly unscientific and not in accordance with the tenets of progressive American medicine.

62 WEST EIGHTY-NINTH STREET.

THE THYROID GLAND AND ITS DEGENERATIONS IN RELATION TO GYNECOLOGY AND OBSTETRICS.

BY

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NOTWITHSTANDING the extensive literature upon this subject, the exact nature of the interrelation of the ductless glands remains conjectural. Unfortunately observations and experiments which could

only lead to surmise have been stated in terms of a proven fact and this has served to retard progress. The supposed indication of an experiment in this complicated system of the ductless glands may be so modified by an unknown element as to make it difficult to draw stable conclusions and therefore an element of uncertainty must attach to our knowledge at the present time. On the other hand, Nature is carrying on a vast experiment and many things have become a matter of common observation. It is not the purpose of this paper to discuss the large question of the thyroid gland and its degenerations except as it touches the question of the function of the productive organs, yet in this connection the phenomenon exhibited by the thyroid gland cannot well be overlooked.

In this gland we have a structure proven to be of vast importance to the balance of metabolism, yet it is an organ subject to various minor and major changes as to size, contour, structure and function. These changes are evident in a variation in the amount of internal secretion, if not in its quality, resulting in hyper-, hypo- and possibly in some cases in dysthyroidism with their attendant evils of metabolism, and its mechanical interference from the growth, embarrassing respiration, circulation and nerve function, together with deformity.

There seems to have been a widespread inclination to consider a goiter as either of the simple, or of the exophthalmic variety and as though one could not readily become the other. Wilson states that the histology of an excised portion of the thyroid enables him to relate the *symptoms* from which the patient has been suffering, but this must be only relatively accurate and subject to exceptions, for the gland changes in size and in amount of secretion with such rapidity at times as to suggest a functional change rather than an organic one, or functional disturbances vary in a given growth, the normal amount of secretion, hyper- and hypothyroidism following each other sometimes in rapid succession.

All authors agree that when goiter is endemic, cretinism, myxedema and exophthalmos are common. It seems fairly accurate to state that:

(1) Hyperthyroidism may exist even to a marked degree with slight, moderate or extensive hyperplasia of the thyroid gland.

(2) Hypothyroidism may exist with apparently normal sized gland or with moderate or extensive enlargement.

(3) The normal amount of secretion may take place with a small amount of gland or with moderate or extensive enlargement.

(4) Hyperthyroidism may be succeeded by a normal amount of

secretion or hypothyroidism with or without changes in the size of the goiter.

(5) Hyperthyroidism may follow a normal secretion or hypothyroidism with or without changes in the size of the goiter.

(6) Hyperthyroidism may be the result of the escape of thyroid secretion previously stored within the gland.

(7) Hypothyroidism may occur, or the normal amount of secretion be eliminated during this storing of the thyroid secretion within the gland.

(8) A moderately or greatly enlarged thyroid may cause mechanical disturbances and embarrassing deformity with or without disturbances of the internal secretion.

(9) More thyroid activity is demanded at certain periods than at others.

(10) Pathologic activity as to growth, degeneration and secretion frequently follows the periods of greater physiologic activity.

It now remains for us to consider the relation of the reproductive organs to these changes under the following heads:

(1) What relation does the thyroid bear to the sexual organs?

(2) What effect do physiologic and pathologic changes in the reproductive organs have upon the thyroid and its functions?

(3) What effect do thyroid changes have upon the reproductive organs and their function?

A close relationship has been noted since early times by Aetius, Spraine, Hunter, Petit and many others. Waller writes: "It is said that in certain invertebrates the thyroid gland opens by a duct into the uterus, but disregarding this, we have unmistakable evidence that the thyroid is a sexual gland and that it normally works in harmony with the other sexual organs." He believes that the thyroid secretion works in conjunction with ovarian and testicular secretion instead of neutralizing them as is maintained by some, but he does not make clear the "unmistakable evidence" of its being a sexual gland except in its association of disturbances. Gaskell in his biological studies furnishes an explanation along the line of anatomical relationship, although anatomical connection is not necessary to explain the effect of internal secretion as is perhaps shown in the effect of castration of domestic animals, the male sexual markings of horn, tusk, shape of head, etc., ceasing to develop with the removal of the testicles.

Gaskell says: "Perhaps the most striking result of the researches is the discovery that the thyroid gland is derived from the uterus of the palæostracan ancestor. Yet so clear is the evidence that it is

difficult to see how the homology can be denied. In the one animal (Palæostraca) the foremost pair of mesosomatic appendages forms the operculum, which always bears the terminal generative organs and is fused in the middle line. In many forms, essentially in Eurypterus and the ancient sea scorpions, the operculum was composed of two segments fused together: an anterior one which carried the uterus and a posterior one which carried the first pair of branchiæ.

"In the other animal (Ammocætes) the foremost segments of the mesosomatic or respiratory region, immediately in front of the glosso-pharyngeal segments, are supplied by the facial nerve, and are markedly different from those supplied by the vagus and glosso-pharyngeal, for the facial supplies two segments fused together, the anterior one, the thyroid segment, carrying the thyroid gland, the posterior one, the hyoid segment, carrying the first pair of branchiæ.

"Just as in Eurypterus, the fused segment, carrying the uterus on its internal surface, forms a long median tongue which separates the most anterior branchial segments on each side, so also the fused segments carrying the thyroid forms in Ammocætes a long median tongue which separates the most anterior branchial segments on each side.

"Finally, and this is the most conclusive evidence of all, this infection, displacements and tumors, points strongly to the conclusion that the thyroid gland of ammocætes is totally unlike that of any of the higher vertebrates, and indeed, of the adult Petromyzon itself, but it forms an elaborate complicated organ, which is directly comparable with the uterus and the genital ducts of animals, such as scorpions. Not only is such a comparison valid with respect to its shape but also to its structure, which is absolutely unique among vertebrates, and very different to that of any other vertebrate gland, but resembles in striking manner a glandular structure found in the uterus, both of male and female scorpions.

"The generative glands in Limulus, together with the liver-glands, form a large glandular mass, situated in the head-region closely surrounding the central nervous system, so that the genital ducts pass from the head-region tailward to the operculum. In the scorpion they lie in the abdominal region, so that their ducts pass headward to the operculum.

"Probably in the Palæostraca the generative mass was situated in the cephalic region as in Limulus, and it is probable that the remnant of it still exists in the Ammocætes in the shape of the peculiar large cells packed together, with pigment masses in between them,

which form such a characteristic feature of the glandular-looking material which fills up the space between the cranial walls and the central nervous system.

"Finally the relationship which has been known from time immemorial to exist between the sexual organs and the thyroid in man and other animals, and has hitherto been a mystery without any explanation, may possibly be the last reminiscence of a time when the thyroid glands were the uterine glands of the palæostracan ancestor."

The same author further states "that though these were once intimately united and are now widely separated, a mysterious subtle connection continues to exist between the thyroid gland and the generative organs even up the highest vertebrates." The greater frequency of goiter during sexual life both in male and female indicates a close physiologic relation. The greater frequency of goiter in the female and the greater susceptibility of this sex to experimental hyperthyroidism, the enlargements of the thyroid at puberty or slightly previous thereto, at the menstrual period, at marriage, during courtship, during a period of excessive coitus, accompanying nymphomania, during pregnancy, during the puerperium, at the menopause and with uterine or ovarian irritations due to congestion, or infection, that there is an interrelation more active in the female than in the male.

Jenks states that it is a structure of much more importance in the economy of woman than in man—it is always larger and diseased much more frequently—resulting in cretinism, goiter and exophthalmia. Laycock in 551 goiters found men affected twenty-six times. Toules found men affected eight times in fifty cases, Mitchell ten men in 100 cases; Withuysen, quoted by Luton, found three males out of forty-eight cases; as high as 95 per cent. of females was reported in the *N. Y. Times*, Dec. 8, 1889, in an epidemic in Montgomery County, Ohio. Osler reports the proportion in the sexes as eight women to one man in exophthalmic goiter. Sporadic goiter affects females very largely, but endemic and epidemic goiter, while showing a preponderance in the female, frequently attacks men. Young men are known to have used the water of certain wells to produce an enlargement of the thyroid gland that would exempt them from army service. There is abundant evidence that there is an etiologic factor other than that of the sex organs of male or female, but whether it be found in the water or whether, if in the water, it be an organism or a chemical product, is not known. But whatever other etiologic factor is present, it works apparently with the sex

factor in the female to create a greater preponderance of goiter in women. Whatever may be the eventual outcome of thyroid enlargement, a large proportion date their beginning or exacerbation to some period of sexual activity and this is not infrequently to disturbed activity, such as delayed or disturbed puberty, painful menstruation, excessive coitus, prolonged or difficult labor, diseased appendages, etc. Lange says: "Hyperplasia of the thyroid gland is a physiologic symptom of pregnancy." "Pregnant animals (cats) need a larger quantity of thyroid matter for the maintenance of their good health than those that are not pregnant." Here, enlargement of the thyroid gland fulfills presumably a definite need but the occasion for enlargement is not so plain in cases of pelvic diseases, menstrual disorders, etc. Waller is of the opinion that the thyroid enlarges in response to the need of more thyroid secretion to take the place of deficient secretion from the ovaries. Goodall and Conn, on the other hand, are of the belief that the thyroid enlarges in an effort to furnish sufficient secretion to neutralize an oversecretion from the ovaries, and that this secretion from the ovaries is furnished by the interstitial cells. Freund says that the increase of the size of the thyroid gland during pregnancy is a quite natural process caused by the general hypertrophy of the circulatory system. The enlargement of the thyroid during puberty, menstruation, the presence of fibroids of the uterus, etc., he attributes to the disturbance of the circulation. Waller's belief would seem to be denied by the fact that the removal of a diseased ovary has resulted in the disappearance of the hyperthyroidism and return of the gland to nearly normal, and further by the fact that increase of the size of the thyroid gland so frequently takes place with menstruation, during the period of great ovarian activity, and subsides thereafter. Again the ovaries show no inclination to take the place of the thyroid gland if it is removed. As against the theory that the thyroid gland neutralizes the ovarian secretion, we cite the fact that hyperthyroidism and not hypothyroidism is apt to accompany these enlargements due to increased ovarian irritation, showing no lack of thyroid secretion. It seems quite possible that, as we may have thyroid disturbances without pelvic disease and pelvic disturbances without thyroid changes, so we may have disease of both structures without their having the relation of cause and effect. While we have yet much to learn in regard to the interrelation of the internal secretions, yet it seems not unwarranted to say that the products of the reproductive organs under the many forms of irritation mentioned, stimulate the thyroid gland into activity and growth at times

out of proportion to the needs of the body, and that a gland thus stimulated develops pathologic processes and continues activity, or may hyperinvolute, thus causing hypothyroidism and myxedema. Observations seem to indicate that the removal of the ovaries causes no marked changes in the metabolism if the thyroid gland continues activity, but that an occasional case is met with in which hypothyroidism and therefore obesity develops. Ovarian extract seems to relieve these patients of hypothyroidism, due not unlikely, to its ability to stimulate thyroid action, but other patients are more readily relieved by the administration of thyroid extract, possibly because the thyroid is unable to be stimulated unto action. Many cases of hypothyroidism are seen in women with ovaries intact, exhibiting amenorrhea or scanty flow and who are improved by the same line of treatment.

Not only must we consider the effect of pregnancy as a causative factor of thyroid enlargement, but we must consider the effect of pregnancy upon an existing goiter. Hyperthyroidism without marked degenerative changes may at least temporarily decrease by pregnancy inasmuch as there is a greater call for thyroid secretion and therefore the excess is lessened. Cases of improvement are recorded by Charcot, Trousseau, Basedow, More, Houard and others. This result is far from constant and many times the hyperthyroidism develops or is increased during pregnancy. Such cases are reported by Freund, Hennig, von Wecker, Roberts, Hutchinson, Renaut and many others. One case was operated by myself.

Stove reports a case that ended fatally after artificial abortion; Roberts performed laryngotomy in the sixth month of pregnancy with fatal termination twenty-nine hours after the operation. Guillot reports two cases, where the pregnant women died after laryngotomy and one where the woman died asphyxiated before any operation had been done. A case of Morgan's died asphyxiated shortly after spontaneous delivery. He had considered tracheotomy, but did not perform it because the patient's condition would not allow general anesthesia. When we remember the heart and kidney degenerations, dyspnea and emphysema that result from hyperthyroidism, it is fortunate that pregnancy seldom takes place in advanced cases, and it must be looked upon as a further menace in cases with even moderate symptoms of hyperthyroidism and the case should be carefully supervised.

Mrs. P., thirty-four years of age, mother of six children, developed marked hyperthyroidism with dyspnea in the middle of the fourth month of her seventh pregnancy. Two distinct lemon sized

masses were removed from the right side together with the isthmus, with complete relief from the hyperthyroidism and dyspnea. Pregnancy continued undisturbed, a healthy female child being born.

The enlargement may, as a result of pregnancy and labor, develop acute symptoms of obstruction, especially as rupture, or dilatation of the blood-vessels may take place or a cyst may rupture, allowing hemorrhage to occur. The enlargement and trauma which accompanies labor may result in a rapid increase in size following labor.

Mrs. M. M., age twenty-four, mother of two children. Goiter first noticed at the age of fourteen. Marked enlargement took place after each delivery. During the height of labor pains, marked engorgement was observed and pain in the thyroid was complained of.

Effect of Hyperthyroidism upon the Structure and Function of the Reproductive Organs.—Increased or lessened activity of the thyroid gland has marked influence upon metabolism, and therefore bodily health. It is therefore very difficult to say whether a certain disturbed function of the reproductive organs is due to the direct effect of the thyroid disturbance or whether it results from the general ill health produced by hypo- or hyperthyroidism. As bearing upon the question of the effect of the thyroid upon the sexual organs Goodall and Conn quoted nine cases from Pinard. I will quote one of these cases as rather illustrative of the group and may venture the opinion that they are equally good if not better illustrations of the effect of ovarian disturbances upon the thyroid. This is admitted by the above writers.

CASE V.—(Pinard, quoted by Goodall and Conn). Amenorrhea followed by appearance of typical exophthalmic goiter. Menstruation returned later and with the setting in of ovarian function symptoms of goiter began to disappear. A sister had synchronous onset of menorrhagia and exophthalmos. Improvement of the latter came on with the improvement of the former.

We have observed cases in which it seemed very plain that the ovarian disturbance was a causative factor in the thyroid disturbance as in the case of hyperthyroidism with each menstrual period, but there are other cases in which a possible vicious circle is set up, in which one disturbed function acts upon the other. Trousseau says: "I am tempted to accord it (suppression of the menses) a prominent place as a factor in the etiology, course and duration of exophthalmic goiter. A distinct class of cases is seen also in which hypothyroidism results in the patients becoming fat, sluggish and toxic. The patient may present amenorrhea or metrorrhagia or

menorrhagia. These cases usually yield nicely to thyroid treatment, but they also yield at times to ovarian extracts and it is difficult to say that here we may not have primarily some faulty action of the ovaries."

Chrustalew offers something tangible in the way of postmortem findings in Basedow's disease. After examining seven cases he states: "the whole organism is affected. After the thyroid glands the genital glands are changed to the greatest extent. Especially in the ovaries we find processes of involution and disappearance of the specific elements and increase of connective tissue and formation of cysts." In the uterus and the mammary gland he also found decrease of glandular structure and increase of connective tissue, but so frequently do these changes result in all these organs and so constantly are they the result of age that we would deem this insufficient evidence in itself of the effect of hyperthyroidism either directly or indirectly. Kocher and Ruebsamen believe that sterility in myxedema and cretinism is not so much the inability of the reproductive organs to functionate as it is the lack of sexual desire. Ruebsamen instances three cases observed by him, one case of myxedema and two cases of cretinism, in which conception took place after a single coitus which in each case was a violation, the patients having no or little sexual desire. Weil cites cases in which thyroid extract was administered for sterility with success. Waller reports a case, age thirty-nine who after amenorrhea, the result of double ovariectomy, had the menses return for four months while taking thyroid extract, amenorrhea returning upon the cessation of the thyroid extract administration. The improvements made in patients' pelvic symptoms and the correction of menstrual irregularities upon thyroid administration are among our strongest evidence of the effect of the thyroid upon the reproductive organs. Ward, Porter, Mayo and others are of the opinion that hypothyroidism is an important factor in the toxemias of pregnancies and recommend the administration of thyroid extract. Porter holds that goiter in the mother predisposes to bone diseases in the offspring. I have observed cases of goitrous mothers giving birth to children with large thyroids. That cretins results from exophthalmic mothers is widely believed. Goldstein, who has given no little attention to the breeding of Boston bulldogs, says that it is almost universally observed that a goitrous bitch, while perhaps valuable as a show dog, is worthless as a breeder, the pups developing poorly or dying of rickets, etc. Hertighe, quoted by Thompson, believes that thyroid extract given to lactating women increases the flow of

milk and Bang believes that the active principle is excreted by the milk. Thompson quotes the further interesting fact from Morse and Cathala that a marasmatic goitrous child improved rapidly when thyroid extract was fed to the mother.

Lange, Halsted of Baltimore, Thompson of Chicago, Marine and Leonard have experimented with the effect of the removal of the thyroid during pregnancy and the results indicate that a less amount of gland may be removed safely from the mother than when not pregnant, and that the young *in utero* suffer with the removal of three-fourths or four-fifths of the gland. Almagia publishes some interesting experiments: (1) On young pups the thyroids and parathyroids were removed, the young animals showing no bad effect while they were being suckled. (2) The thyroid was removed from the suckling mother, the pups losing vitality on the second and third day and going into coma four to five days thereafter. Postmortem examination after the fourth or fifth day showed changes in the hypophysis. Algier and Thenveny report experiments to show the effect of thyroidectomy upon the ovaries and report very little if any structural changes, but show functional disturbances, the rut being short and scant and conception not readily taking place.

There being no time to further detail clinical material it may be grouped as follows:

(1) Cases with enlarged thyroid at birth. In one case the thyroid offered obstruction to flexion during delivery and seemed to embarrass respiration immediately afterward. These children with a small percentage of exceptions had been born of goitrous mothers and in one case three generations of maternal ancestors had goiters. These goiters in children disappeared during the first few months of life without treatment.

(2) Cases appearing at about the time of puberty. Many of these have subsided, (*a*) to give no further trouble, (*b*) to again enlarge with or without some pelvic disease or physiologic process. Some of these have never become quiescent, but with exacerbations and remissions have continued to annoy the patient until they furnished a great disability.

(3) Cases noticed first during pregnancy. Many of these may be termed a physiologic hypertrophy and congestion and subside after delivery, but many show their pathologic tendency by developing hyperthyroidism and by taking on extensive growth and degeneration, and some of which show very little improvement after delivery or perhaps grow markedly worse.

(4) Cases which have sprung into prominence during the puer-

perium. These have no doubt suffered trauma, distention and stretching of blood-vessels during delivery.

(5) Those cases which have developed and given greatest disturbances during the progress of some pelvic disease. Some of these have been operated on at the time that the pelvic disease was corrected and in some cases the thyroid has been so markedly at fault and the operation been so extensive that the pelvic disease had to be left. In one case a secondary operation removing a part of the thyroid gland had a marked beneficial effect upon painful menstruation (Woolston's case).

(6) Cases in which the beginning was apparently not connected with pelvic functions or disease and yet in some of which these functions had the effect of causing exacerbations.

Treatment.—The treatment of the complication of thyroid enlargement and disturbance of function and disease of the reproductive organs include the treatment for thyroid disturbances in general and some features not called for in thyroid derangement existing alone. I think it may consistently be urged that the growing girl receive greater attention at puberty, for the supposedly physiologic disturbance of a thyroid at this time may be prolonged into a pathologic process of later years. Rest, proper exercise, pure air, etc., should nurse the girl into a healthy menstrual life. Tonics and ovarian extracts should be administered in delayed menses, and in cases not suffering from hyperthyroidism, thyroid extract is entirely worthy of a trial. Cases showing enlargement of the thyroid during pregnancy should be carefully supervised. Any evidence of hypothyroidism, toxemia, or eclampsia should receive a careful but thorough course of eliminants. Thyroid extract here may be counted a valuable remedy. In cases of hyperthyroidism of moderate degree, rest, ice and bromides may be administered and the serum of Beebe, Moebius or Rogers may be used. Simon, Berger, Hooten, Rabe, Stoney, and many others report improvement. Stoney reports fourteen complete cures, twenty-two cases greatly improved, four cases moderately improved. Hooten reports a series of cases and believes the *x*-rays depress and diminish to within normal limits the secreting powers of the thyroid gland and that they lessen the nervousness, dyspnea, tachycardia and tremor. While ordinarily we wish a cure, we are quite satisfied during pregnancy with improvement.

In cases of marked hyperthyroidism, not yielding to the above treatment a thyroidectomy or ligation of one or both poles should be considered or possibly in some cases the induction of labor should be

chosen. All cases of pregnancy with associated goiter with distressing symptoms and especially at labor should be placed, if possible, in a well regulated hospital. The labor should be made as easy as possible by the use of the forceps or possibly with vaginal Cesarean section in some cases. Great risk is encountered during difficult labor pains of acute dilatation or aneurism, or rupture of the blood-vessels. Or acute congestion may cause edema and acute obstruction of the trachea. To avoid these disturbances, I would suggest the use of carefully applied adhesive straps in a way to leave the thyroid and trachea not constricted between labor pains and yet to prevent great dilatation of the gland during a labor pain.

The exigencies of the case and the necessity of avoiding a prolonged operation make some procedures permissible that have otherwise become obsolete. In some cases a cystic goiter might be opened and drained, or an isthmus might be quickly severed, thereby freeing the trachea, or a tracheotomy may be required. A localized acute injection may require drainage; a hemorrhage may require immediate ligation of vessels or extirpation of gland. Certain cases will arise in which we may say that the patient is in greater need of extirpation of the gland *because* of her pregnancy, instead of pregnancy being a bar to the operation, but in such a case hypothyroidism should be avoided by thyroid feeding unless the normal balance is maintained. A number of authors have recommended pregnancy as a means of relief in hyperthyroidism, but we believe, and clinical evidence verifies the position, that this is entirely irrational in spite of the temporary relief in symptoms that might ensue. Porter recommends the injection of hot water to control the growth until pregnancy is passed.

In cases of goiter with pelvic disease, one's experience and judgment may be taxed to decide the line of procedure. It is always safe to say that hypothyroidism with or without pelvic disease should receive a trial of thyroid feeding. Cases of moderate hyperplasia with or without hyperthyroidism connected with displacements, infections, adhesions, cystic ovaries, tumors, etc., may be expected to make marked improvement upon the correction of the pelvic disease.

Cases of marked enlargement, irregularities and degeneration of the thyroid, or extreme hyperthyroidism, should receive appropriate treatment according to the local condition and general health. The pelvic condition may or may not receive attention at the same time, two safe operations being chosen rather than one dangerous

one. If the pelvic condition is the more urgent, the thyroid may be left for further operative attention.

Recently a negress entered my service in Cook County Hospital presenting a large uterine fibroid and a troublesome enlargement of the thyroid, the latter being so marked that she had been advised to have the thyroid removed at once, the abdominal operation to follow after recovery from the thyroid operation. Having in mind the marked improvement sometimes noted the order was reversed and the uterus removed. While the patient was still in the hospital the thyroid decreased so as to be scarcely noticeable.

Goodall and Conn cite a case of exophthalmic goiter in a young married woman who was promptly cured by a vacation, as she had been a victim of an overpassionate husband. In one of my cases, nymphomania and hyperthyroidism were driving a young woman of twenty-one to distraction, and it was thought best to combine the removal of a lobulated glandular right lobe, isthmus and a part of the left lobe of a goiter, with the correction of a uterine displacement and the removal of an ovarian cyst of small size which was adherent. Her hyperthyroidism has disappeared and a marked improvement in general health and decrease in nymphomania is shown. Cases could be related to illustrate each of these lines of treatment.

After weighing the clinical and experimental evidence it seems not unfair to conclude that there is such a relation between the physiology and pathology of the reproductive organs and the growth, function, and degeneration of the thyroid gland as to demand a careful consideration of the pelvic organs in every case of disturbed growth or function of the thyroid gland.

It is equally desirable to consider the condition of the thyroid gland as to size and function in all cases showing symptoms of respiratory obstruction, hypo- or hyperthyroidism, combined with pelvic disease.

While there are periods in the life of a woman which favor physiologic hypertrophy of the thyroid gland we must recognize that not all disturbances are of this class—some of them are most virulently pathologic.

So-called physiologic hypertrophies of the thyroid gland furnish a percentage of cases in which the morbid activity continues as a pathologic process, while in others hyperinvolution takes place.

All cases of physiologic enlargement of the thyroid gland should be studied with a view of restoring a proper balance before organic changes take place.

TRANSACTIONS OF THE OBSTETRICAL SOCIETY OF PHILADELPHIA

Meeting of Thursday, May 7, 1914.

The President, DR. GEORGE E. SHOEMAKER, in the Chair.

DR. PHILIP F. WILLIAMS and (by invitation) DR. CLIFFORD B. FARR reported, on

THE NONPROTEIN NITROGEN OF THE BLOOD IN THE TOXEMIAS OF
PREGNANCY.*

DR. WILLIAM E. PARKE reported

A CASE OF REMOVAL OF BOTH BREASTS, WITH SUBSEQUENT PREGNANCY
AND ENTIRE ABSENCE OF LABOR PAINS.†

DISCUSSION.

DR. BARTON COOKE HIRST.—This is an interesting subject but we ought not to jump at conclusions upon this one observation about the influence of the mammary gland. I have seen women who had exactly the same history in labor as this patient with both breasts perfectly normal. I have seen women in whom labor pains could not be excited. While Dr. Parke's case is interesting and instructive and should be placed on record and will I hope be followed by other observations, we cannot jump to conclusions about it. I recall a series of experiments conducted by Professor Smith in which he injected guinea-pigs with the extract of functioning mammary gland and he could while they were under the influence of the hormones prevent impregnation.

DR. GEORGE ERETY SHOEMAKER.—I should like to ask Dr. Hirst whether the breasts were normal in development and in subsequent function.

DR. HIRST, replying to Dr. Shoemaker.—As far as I remember they were. There was dilatation of the os up to the fullest extent. Such cases do occur, whether the breasts are functioning or not. I think Dr. Parke's case is a very important one, and we owe him a debt of gratitude for putting it on record.

DR. W. R. NICHOLSON presented a

* For original article see page 614.

† For original article see page 606.

CASE REPORT ILLUSTRATING CERTAIN DANGERS IN THE USE OF THE
INTRAUTERINE STEM PESSARY.*

DISCUSSION.

DR. BARTON COOKE HIRST.—I have been much interested in this subject and pointed out the dangers in connection with it some six or seven years ago. I used the drains a couple of years but gave them up because I saw two cases of infection follow the use of the intrauterine stem for the treatment of sterility. I feel, therefore, that I dare not use this instrument at present, knowing that infection is always possible. I have been advocating for years the Schatz method of dilating the uterus. Last year in the Howard Hospital alone I think we used it some sixty or seventy times, so I have probably used it something like 100 times a year employing my modification of the Schatz's metranoikter.

We do not always see our failures. I have in the last two months had to open the abdomen because of the use of a uterine stem, and two weeks ago in another case the woman had a tube on the right side which was greatly increased in size at the fimbriated end. There was no pus in the tubes; the condition was not gonorrheal, but consisted of an enormous hypertrophy of the mucous membrane. The constant pain compelled the woman to consent to operation.

DR. RICHARD C. NORRIS.—It is not to be denied that there is a risk in using the stem pessary. Dr. Nicholson refers to eight cases requiring section. In contrast to this I may mention that in the 800 cases at least 200 have been relieved of dysmenorrhea. In spite of our greatest care we shall at times have infection. We cannot always tell, even with the woman under ether, whether there may not be an infection. In gonorrheal infections I think lies the greatest danger in this operation. I think we all recognize that the treatment carries with it some risks. I have eleven patients at the present time who are wearing these stems. Dr. Nicholson's case will not influence me to abandon the stem pessary. I have thus far had no accident. I feel that while the results of this operation are in the main good, we must realize that there is a distinct danger in method of treatment, and that it is to be undertaken only by the experienced gynecologist.

DR. JOHN G. CLARK.—Concerning Dr. Nicholson's report of his case, I would say that there are two criticisms which may be offered. First, that the patient was permitted to take a nonsterile douche during the time the Wylie drain was in place. It is our custom to instruct patients not to use any form of a douche while the drain is in place, for we believe it is a source of danger. It would, therefore, be difficult in looking over this case history to determine whether it was the mere presence of the foreign body in the uterus or an accidental infection from the use of the douche that caused the infection. A second point which I believe is also open to criticism is the acceptance of opinions which come as the result of a circular letter. I

* For original article see page 608.

have been particularly impressed with the fact that such opinions are of little value for none of us know accurately the results of our work unless cases are very closely followed up.

Concerning the use of the Wylie drain, I cannot speak with absolute authority, but my associate, Dr. Charles Norris, is in a position to do so, for he has looked up carefully our cases and has followed the histories of a considerable number. I will ask him, therefore, in the course of the discussion to report these results. Without question these drains have given infinitely better results so far as overcoming sterility is concerned than any other method which we have employed. I most reluctantly began to use them for I have always felt that such a foreign body might be the source of trouble, and the report of Dr. Nicholson's case is a timely one, for it emphasizes the possibility and warns against the feeling of assurance that they are always innocuous.

Nevertheless, as we have observed our series of cases, the results have been so excellent in overcoming sterility that I would most reluctantly abandon their use. If we were to cast aside every surgical measure in which an occasional bad result occurs, there is not one single operation in surgery that would stand the test. If one were to put before the average woman who is sterile and anxious to have a child the series of cases in which this condition has been overcome by the use of a Wylie drain and portray to her the possible danger, such as Dr. Nicholson's case exemplifies, I believe only the occasional patient would be deterred from having the operation performed.

The objection Dr. Hirst offers to the use of this instrument would not I believe apply to modern standards. If we were to measure any surgical procedure by the results of Goodell and his contemporaries all of us would abandon surgery, for the simplest surgical interventions were attended with infinitely greater danger than they are at the present time with advanced improvements in technic. Also, the case, which is cited, of a woman upon whom he operated two years subsequent to the employment of a Wylie drain suffering with a tubal inflammatory lesion would not be a very strong argument against this instrument, for I do not see how it is possible to ascribe her infection to an instrument which was used so many months previously and during which interval there was every possibility of another intercurrent infection taking place. Until therefore stronger evidence is brought to bear in opposition to our own experience, I should hesitate to give up this very valuable means of overcoming sterility and correcting very severe cases of dysmenorrhea.

DR. CHARLES C. NORRIS.—Dr. Nicholson's paper embodies two excellent principles, in the first place he has reported a failure, a comparative rarity in medical literature. There can be no doubt but that we learn as much if not more from our failures as from our successes, and secondly, he has endeavored to determine the ultimate outcome of the cases under discussion. I believe that the "follow up" system is an extremely important factor in modern surgery for only by it can we become acquainted with the actual results

of our work. It is by no means true that because a patient leaves the hospital in good condition that she is cured of the disease for which the operation was performed and will henceforward be free of symptoms.

An intrauterine stem pessary of any kind is a foreign body, it keeps the cervical canal dilated and probably produces a certain amount of irritation. Although the vaginal secretion undoubtedly possesses definite bactericidal properties, which is most pronounced in the deeper portions of the vagina and is especially marked in the nulliparous woman—the type of patient in whom this form of treatment is usually employed,—the vagina can by no means be regarded as a sterile cavity. A certain proportion of infection would therefore be theoretically expected. Practically, however, although I have been using the stem pessary for upward of seven years I have never seen a case of infection which I think should be attributed to this instrument. Like Dr. Richard C. Norris I may have one tomorrow but even so I should be inclined to feel that the benefits derived from this form of treatment far counterbalance the ill effects.

If we honestly analyze almost any large series of operations we will find a certain proportion of infection. With our modern technic this is extremely small. The question therefore to be decided is how much infection follows the use of the drain in properly selected and properly treated cases and if such proportion is greater or less than with other operative procedures and what is the final outcome of the patients regarding their ultimate cures.

In my opinion the drain should not be employed unless there is a cervical stenosis or an undeveloped uterus, the presence of a pre-existing infection of any sort absolutely counterindicates its use. The patient should be under a general anesthetic at the time of its insertion and it goes without saying that absolute asepsis should be practised at this time. These indications are, I believe, generally accepted. Further precautions are also necessary. The patient must be carefully safeguarded while the drain is in place. Vaginal douches are positively counterindicated. In the nulliparous vagina on account of its size, the possibility of vaginal secretions or septic material being forced into the uterus at the side of the drain, during the process of taking a douche, is a very real one. The patient should be kept under observation while the drain is in place. This is very important. Should the drain tend to prolapse from the cervix it should be removed, the pushing back of such an instrument is naturally a possible source of infection. These patients should be especially guarded from possible infection for a few days after the removal of the drain.

I have known of one case in which the drain was, I think, unjustly thought to have been the cause of infection. In this instance the case was one in which I operated for sterility employing the usual technic and postoperative precautions. Convalescence was normal, the drain was removed in six weeks, the patient had one menstrual period and then became pregnant and went to term. She was delivered by her family physician and during the puerperium

developed the usual symptoms of a mild infection. She now has an adherent ovary on one side and slight cellulitis, not however of a sufficient severity to demand operation. It certainly seems far-fetched in the face of an absolutely normal convalescence and subsequent pregnancy, to attribute, as was done by her physician, this puerperal infection to the insertion of the drain ten or eleven months previously.

In 1910 Dr. E. P. Barnard and I reviewed the after results of seventy-three cases of dysmenorrhea which had been operated upon in the Gynecological Department of the University Hospital. We included in this series no case which had been operated upon less than one year. These cases were divided into three groups, (1) those upon whom the ordinary dilatation operation had been performed with the Goodell-Ellinger dilator, (2) those subjected to either the Dudley or Pozzi splitting operation, and (3) those treated by the stem pessary. Not only did the latter method prove more efficient as a curative agent but no infection followed its use. This is certain as far as this series of cases is concerned.

Two years ago I followed the after history of thirty-five cases of sterility which had been treated with the stem pessary. Like the preceding series no cases were included in this group which had been operated upon less than one year. The results were excellent and no infection had occurred.

Since 1910 the use of the stem pessary in properly selected cases—those which formerly would have been subjected to an ordinary dilatation operation—has been employed routinely by all of the members of the Gynecologic Staff of the Hospital of the University of Pennsylvania. This series is now a large one. I have questioned these operators and none know of any untoward effects following the employment of this form of treatment. The fact that they use it is sufficient to prove that they believe it safe and efficient. In fact as a curative agent its value has rarely been questioned. I have personally seen the large majority of cases operated upon at the University Hospital and in none of these has there been any evidence whatever of infection during their stay in the institution. In these cases, however, infection cannot be excluded as ill effects may have developed subsequently. It has been stated and with truth that the patients upon whom we fail to effect a cure are prone to go to other operators for relief, and this is undoubtedly true, yet it seems extremely improbable that in such a large series of cases as this, that we would not be cognizant of some cases, were infection of frequent occurrence. Furthermore a number of these cases have been actually observed and since my previously mentioned report in 1910 regarding the results of this form of treatment for sterility I have delivered a number of women treated by this method and know positively of quite a number of others delivered by other physicians.

The value of statistics in any form has been repeatedly questioned. I am a firm believer in statistics provided that they be accurately formulated. Let us consider for a moment those presented by Dr. Nicholson. We all know what a difficult and thankless task collect-

ing statistics is. It does seem, however, that more details would have added greatly to the value of his work. Of four hundred cases it is stated that in eight serious infection followed the use of the drain. With the exception of his own case no details whatever are presented regarding any of these cases. In Dr. Nicholson's own case the patient took douches while the drain was in place and in all probability infected herself in this way, as it is stated that her convalescence for the first week or so following the operation was normal. As has been stated, practically all operators agree that no douches should be taken while the drain is in place. The discussion has brought out that in another case the operator is inclined to attribute the ill results obtained to bichlorid of mercury poisoning. It has been shown that in a third case the infection followed two years after the insertion of the drain. There is no reason to suppose that because a stem pessary has been worn for a month or two that the patient is for the remainder of her life immune to infection. What the actual details of the remaining five cases were we do not know, but if they were of the character of those already mentioned it would seem that the dangers of this form of treatment have been overestimated.

In concluding I would again emphasize the need of accurately compiled statistics. What we should have is actual definite figures from carefully followed up cases. If we do not have them our results are likely to be misleading. None of us wish to use a form of treatment that is attended by an unnecessary morbidity and the following up of our cases is the way to determine this point. I cannot but feel from the large series of cases which I have personally observed, that infection following the use of the stem pessary is an extremely rare occurrence and that the results of its employment have been most excellent—far better than by any other method with which I have had experience. I do not by any means wish to take the position that infection cannot follow its use and for this reason the cases should be carefully selected and given every possible post-operative safeguard.

DR. G. M. BOYD.—I have been using the Wylie drain for a number of years and have had no trouble. We have all, I suppose, had the same difficulty in keeping the drain in place, in spite of the fact that it is sometimes stitched in the cervix. I hope the discussion will include the length of time the drain can be left in the uterus with safety. Any drain which tends to come out must be a source of infection and should not be permitted to remain within the uterus long unless the patient is under careful supervision. I am much interested to hear the results Dr. Hirst has had with rapid dilatation, using the Schatz metranoikter. If the end results are as good as by slow dilatation then this method deserves greater attention by the profession.

DR. HIRST.—I agree with Dr. C. C. Norris that it is important to gain all the information possible upon this subject. Bearing upon this matter, Dr. Williams some time ago investigated from 160 to 170 cases treated by me with the metranoikter. Out of the

number from whom he received replies there was 43 per cent. of cures for sterility. This is a trifle higher percentage than that secured by the drain. If, therefore, we can get better results by a method perfectly safe, it is more rational to adopt that method rather than another which is demonstrably more dangerous.

DR. SWITHIN CHANDLER.—In the use of this pessary we should be as careful as possible to determine before the pessary is introduced that there is no trouble locally; second, that we do not produce too great an injury in our dilatation, and that we do not thus introduce the specific germ causing trouble. In the third place we should be on the lookout for subsequent infection. In regard to the second precaution, these methods and instruments are too often used without proper knowledge regarding them. For instance, no doubt, many of us have seen the ordinary dilatation which precedes the introduction of the pessary, as well as the ordinary dilatation in which the cervix is torn clear through as if the woman had borne several children. In these cases the pessary should not be introduced. These precautions would eliminate a certain amount of bad results. Since our visit to New York I have been using the glass pessary, but so far on account of short time, no doubt, have had no cure of sterility with it. I should like to ask whether any one here has used a longer time and obtained results with the Baldwin pessary?

DR. GEORGE ERETY SHOEMAKER.—I have always looked upon the stem pessary as an instrument to be used with caution especially after the patient goes about. Two cases have happened to come under my observation where it has been used by others and in which salpingitis had followed. I look upon the condition as somewhat analogous to the use of the sterile glass drainage tube in the clean abdominal wound. Those of us who remember the steps by which we were led to abandon the drainage of the clean wound will recall that Dr. Robb and others made cultures of material obtained from different depths of the previously clean wound after the glass drain had been used. The nearer the skin the more organisms could be found and they apparently advanced along the tube, the irritation of its presence being a factor. In the case of the stem pessary, it is again the foreign body in a clean canal, but the outer end of the foreign body lies in a field which is constantly occupied by organisms. If we leave a rubber or glass drain in any clean tract organisms are readily found throughout it after a few days. There is a strong natural line of defense against organisms at the mouth of the uterine cervix. A foreign body like a stem pessary if left in many days tends to break down this defense.

DR. NICHOLSON, closing.—I said in the closing part of my paper that I reported the case with the idea of calling attention to the possible dangers of the method. I have not definitely forsaken this procedure. I differ somewhat with our President in comparing the stem pessary and the uterine mucous membrane with a glass drain and the peritoneal wound. I hardly think that Dr. Chandler's second precaution is pertinent, because I was speaking only of men who know how to make the dilatation. I differ with Dr. Clark

regarding the attitude a woman would take regarding the risk of this procedure no matter how much she desired children. I am perfectly certain that in my case gonorrhoea was not present. I subjected the man to every examination possible.

I realized perfectly well the difficulty in getting statistics for this paper which, in the sense that Dr. C. C. Norris referred to, would hold water. In the instance of the eight men whom I asked for data, the majority were not able to tell me the exact number of cases in which they had used this instrument. In New York City in one clinic they are putting in the stem pessary in exactly the same way as in the day of Goodell. In a large department store in which there is a sick benefit arrangement for the employees, many of the girls have dysmenorrhoea. These girls are examined by a physician, a stem introduced and they return to work in a couple of days.

DR. EDWARD A. SCHUMANN reported

AN OPERATION FOR THE CURE OF STERILITY DUE TO CERVICAL STENOSIS.*

CLINICAL REPORTS.

DR. JOHN A. McGLINN.—Of two specimens I have to exhibit one is a large fibroid tumor.

The second specimen is interesting from the standpoint of diagnosis. It is a uterus taken from a woman forty-nine years of age. Two years ago she came to the hospital with a small amount of irregular bleeding. She refused hysterectomy upon the diagnosis of adeno-carcinoma and returned home. A year later she came back very much improved in health but with a return of symptoms. She again was curetted. There was no appearance in the pelvis of advance of the disease and I doubted whether the pathologist had made a correct diagnosis in the first instance. Without saying anything to him I had him render another report. This was also of adenocarcinoma. Not satisfied with that I submitted slides to another pathologist and he corroborated the diagnosis. Operation was again refused. Two years later she came back and wanted to have the uterus removed. The fundus of the uterus showed marked carcinomatous changes. It is of interest that in this operation I used the method described by Dickinson which is a valuable addition in the technic in a shortening of the time.

ITEMS

The following bibliography was inadvertently omitted from an article on "Fatty Concretions in Ovarian Dermoids" by J. W. McMeans, M. D., which appeared in the AMERICAN JOURNAL OF OBSTETRICS, July, 1914.

* For original article see page 604.

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TO AMERICAN OBSTETRICIANS.

At the International Congress of Obstetrics and Gynecology, meeting for the first time in America at New York, September, 1915, the topic of "Puerperal Septic Infection" will be one of the principal subjects for discussion. To the undersigned has been assigned the review of this subject, and I desire to obtain the results of the observations and experiences of American colleagues upon the following:

First.—The treatment, prophylactic or curative, of puerperal septic infection by vaccines.

Second.—The occurrence of puerperal septic infection by bacteria other than the streptococci and staphylococci, such, for example, as the bacilli coli communis.

Third.—The occurrence of puerperal septic infection from pre-existing foci, as salpingitis, appendicitis, or other collections of pus.

Fourth.—The occurrence of puerperal septic infection from communication by water or possibly atmosphere of contaminated wards.

Such material will be fully credited to its sender.

It is desirable that the American profession be fully represented in the discussion of this important subject.

Reports of cases, reprints, and other material will be gratefully received by Dr. Edward P. Davis, 250 South Twenty-first Street, Philadelphia, Pa.

BRIEF OF CURRENT LITERATURE.

OBSTETRICS.

Retraction of the Uterus on the Fetal Head Separated by Embryotomy.—Potocki and Sauvage (*Ann. de gyn. et d'obst.*, May, 1914) show the possibility of an extremely firm contraction of the body of the uterus on the head of the fetus which has been removed by embryotomy in efforts at delivery. In most cases of neglected shoulder presentation where death of the fetus has occurred delivery by version is possible, or the body and head can be delivered separately after craniotomy. In a case of the authors' efforts at version failed. The body was delivered separately after embryotomy and the head partly crushed. But the upper segment of the uterus then contracted so firmly on the head left behind in the uterus that the hand became paralyzed by pressure and it was impossible to insert two fingers in the mouth or to deliver the head with instruments seeking to grasp it. The lower segment was relaxed and very thin, threatening rupture. Forceps are contraindicated in such cases for fear of rupture. Craniotomy or basiotripsy should ordinarily be performed, but in the authors' case both failed to cause delivery on account of the firm muscular contraction which continued for hours. The muscle applied itself firmly around the fetal head molding itself to its inequalities. Retention of the separated head has been recorded as lasting 112 days, the woman going about her daily avocations, with leucorrhea and occasional crises of abdominal pain. This should not be allowed to occur, as the danger of sepsis is great. The authors' case was finally delivered by removal of the entire upper segment of the uterus with the head in position within it. The patient recovered.

Suprarenal Insufficiency in Pregnancy.—Pedro Zuloaga (*Arch. mens. d'obst. et de gyn.*, May, 1914) says that symptoms of grave suprarenal insufficiency may show themselves in pregnancy or labor, where the traumatism of delivery increases its effects. From his studies of such cases he deduces the following conclusions; suprarenal insufficiency may cause troubles varying in degree during pregnancy, labor, or the puerperal state. It may begin before pregnancy occurs and increase afterward, or may occur for the first time during the pregnancy. Villotoxemia may produce insufficiency of the suprarenals. Again the suprarenals may be congenitally deficient or insufficiency be acquired before pregnancy, which is quite compatible with good health until the additional strain of pregnancy arises. The symptoms may occur as a result of the failure of secretion of the suprarenals or of their angiotonic effects. They are asthenia, lumbo-

abdominal pains, vomiting, constipation, or diarrhea, brain symptoms, and progressive cachexia and emaciation. Arterial hypotension, the white line of suprarenal insufficiency, tachycardia, and collapse end the scene. Isolated the symptoms have no value, but the grouping may permit of a diagnosis. The prognosis will vary with the degree of insufficiency, the intensity of intoxication, and the general conditions. If the diagnosis is made early opotherapy may enable us to save the patient. Incoercible vomiting may result from autointoxication or suprarenal insufficiency. Some cases of sudden death in pregnant women may be caused in this way. Every pregnant woman should have arterial tension measured if vomiting is incoercible, and other symptoms of insufficiency should be sought. Opotherapy alone gives any hope of success in these cases. Even suspicious cases should be treated with the fresh gland or adrenalin. When this fails we should interrupt pregnancy. Whenever this condition is recognized treatment should continue after delivery so as to avoid serious complications in the puerperal state. Women having suprarenal insufficiency should be told to avoid pregnancy as tuberculous ones are.

Treatment of Toxemia of Pregnancy by Duodenal Enema.—E. McDonald (*Med. Rec.*, July 18, 1914) has treated twelve cases of toxic vomiting of pregnancy by means of a duodenal tube, which is a modification of the Jutte tube. The procedure is as follows: A small rubber tube about the caliber of 12 F., is thrust into the stomach after the pharynx has been anesthetized by a local anesthetic spray. When the tube is down about twenty-two inches, eight ounces of a solution of sodium chloride a trifle stronger than the physiological solution, is injected by means of a syringe through the tube into the stomach. This usually effectually neutralizes the tendency to vomit. The tube is then thrust further down to about the length of twenty-eight inches. The patient is then placed upon her right side in a semiprone position. The waist bands should be loosened. After a few minutes, suction is made by means of a vacuum bottle and syringe to withdraw some of the contents through the tube. When bile or intestinal juice is obtained, it is considered that the tip of the tube has passed the duodenum. The stomach should be empty for several hours before the treatment is done. It is usually possible to pass the pylorus within five to seven minutes. An injection is then made by means of a gravity can of a liter of a solution containing from four to six grams, by measure, of granular sodium sulphate. This "duodenal enema" does not cause pain or straining, and it does not irritate the anus as do saline cathartics. Any other salts than the sodium sulphate, such as magnesium sulphate, common salt, sodium carbonate, may be used, but sodium sulphate is the most efficient and effective in the toxic conditions. This treatment has had the most extraordinary effect on cases of toxemia of pregnancy. No patient has required more than a single treatment, as after the first general hygienic measures can be instituted, such as regulation of the bowels, drinking a large quantity of water, and a simple diet. Among the twelve cases no patient, save one,

has had any vomiting after the treatment. The writer has also used this method in a number of other toxic conditions with good results. The only contraindication to the treatment is an acute or subacute abdominal inflammation. The results of this treatment in toxemia of pregnancy makes the author believe that it is probable that the chief factor in the toxemia of pregnancy is intestinal stasis and intestinal absorption, whatever may be the direct cause of this. It seems possible that the chief locality of this absorption is in the upper part of the small intestine, more particularly in the duodenum, and he suggests that the toxemia of pregnancy may be due to absorption of the duodenal toxin, which also causes a poisoning in intestinal obstruction.

Effect of Involution of the Uterus upon the Nitrogen Output of the Urine.—The total nitrogen of the urine during the latter part of pregnancy is lower than in nonpregnant women; at the time of labor it falls even below the level of pregnancy; while during the puerperium it rises to such an extent as to become greater than that generally accepted as normal. This relatively high excretion persists for about two weeks. The increase in the excretion of nitrogen through the urine, which is regularly observed after labor, has given rise to a good deal of speculation. The correct explanation is very simple. Upon clinical grounds it would seem probable that the phenomenon is associated with the involution of the uterus. This process is now regarded as due to autolysis which breaks the muscle-protein down into simpler substances. These pass into the circulation, are eliminated through the kidneys, and thus increase the amount of nitrogen in the urine. This hypothesis can be tested experimentally. In the two cases studied by J. M. Slemons (*Johns Hopk. Hosp. Bull.*, 1914, xxv, 195) the process of involution caused a rise in the urinary nitrogen and the amount of excessive elimination corresponded to the nitrogenous content of the noninvolved uterus. These observations offer confirmatory evidence of this fact from three points of view: First, by the comparison of the puerperal and postpuerperal periods when the uterus has not been removed; secondly, from the comparison of the aggregate excretion in cases in which the uterus was removed and in which it was not; and, thirdly, from the comparison of the actual daily difference in such cases with the theoretical amount of nitrogen which would be expected as a result of the involutionary process. We may, therefore, conclude that waste-products from the involuting uterus pass into the circulation, are excreted by the kidneys, and in some measure throw additional work upon these organs during the early part of the puerperium. While the increase in the excretion of nitrogen is not large enough to require restriction of diet in the puerperium, provided the patient is normal, in patients suffering from toxemia of pregnancy, the additional work which the kidneys must perform in the puerperium does become a matter of practical importance. In such circumstances these organs should be given the fullest opportunity to recover from the strain to which they have been subjected, and, with this end in view, the diet should be limited. Such precaution is necessary,

not only because the renal cells have been damaged, but also because an excretory capacity somewhat greater than normal is desirable. Formerly, the large nitrogenous excretion in convalescent cases of eclampsia was attributed to the elimination of waste-material which had previously been retained, and whose retention had caused the toxemia. The writer believes that his observations show that the large excretion of nitrogen in these, as well as in normal cases, is due to the involution of the uterus.

Appearance of Noncolloidal Ninhydrin-reacting Substances in the Urine.—While F. H. Falls and W. H. Welker (*Jour. A. M. A.*, 1914, lxii, 1800) were studying the question of the possible substitution of aluminum hydroxid cream for the parchment diffusion thimbles in the Abderhalden serum diagnosis of pregnancy, there appeared a paper by Warfield on the presence of dialyzable ninhydrin-reacting substances in the urine of pregnant women. This led the writers to study the urine under normal and pathologic conditions and during pregnancy. They find that the presence of noncolloidal ninhydrin-reacting substances in urine is of no value as a means of diagnosing pregnancy. The reaction may be absent or inhibited in the urine of pregnant women as well as in normal and pathologic urine. In the various urines treated the only difference in the ninhydrin reaction between the diffusates through parchment, and the filtrates from the aluminum treatment were those of intensity of colors, the aluminum filtrates showing a less intense color with ninhydrin. In the urines reacting positively with ninhydrin the removal of colloidal substances favors the production of the blue color given by this reagent with amino-acids. Such urines before diffusion or treatment with aluminum hydroxid give a color which is not so strong and has more of a reddish cast. This is not the result of the dilution alone. The occurrence of either albumin or indican appears to have no influence on the ninhydrin reaction applied to the colloidal-free urine.

Constriction of Umbilical Cord by Amniotic Bands.—E. Cary (*Surg., Gyn. & Obst.*, 1914, xviii, 730) records a case in which the death of the fetus was caused by constriction of the cord, cutting off fetal circulation, by two bands of recently torn amniotic membrane. The amnion undoubtedly ruptured under the strain put upon it by the presence of hydramnios. After the tear had occurred the amniotic fluid dissected the amnion from the chorion, and allowed the former to float free in the sac. The movements of the fetus tore this into shreds which rolled up to form membranous ropes in the form of loops around the child, the fixed end of the loop necessarily being at the insertion of the cord into the placenta. It seems probable that the whole free, floating portion of the amnion was twisted into two such ropes which happened to cross where they both passed by the umbilical cord. In this way the movements of the fetus managed to tie a knot in the bands around the cord. The fact that both ends of these bands were anchored made every movement of the fetus draw the knot firmer, and as partial asphyxia set in, the movements becoming more violent and, the ropes holding, the cord was

totally constricted and death of the fetus resulted from asphyxia. This increase of fetal movements was noted two days before the onset of labor.

Thrombosis in Pregnant Women.—Cesare Decio (*Ann. di ostet. e gin.*, Apr., 1914) says that histories of puerperal and postpuerperal thromboses are comparatively frequent, but thromboses of pregnancy have been little studied, although they are also not uncommon. The author has made a study of eight cases and bases his conclusions on them. Thrombosis generally occurs toward the close of pregnancy in women in good physical condition. They are attacked by sudden severe pain in one or both lower extremities, followed by localized edema. Palpation shows a hard, tender cord in the thigh or popliteal space. Generally there is no fever or general reaction, and the symptoms subside, the thrombus undergoing resolution. The question of the causation of these thrombi has been widely discussed, whether they arise from mechanical causes, such as pressure, or from infection. In none of the author's cases was there any infective focus from which germs could have been carried to the location of the thrombus. Aschoff considers that thrombi arise at the junction of veins where the lumen becomes reduced, and that layers of coagulated material are gradually deposited there to form the thrombus. The author thinks that the changes in the blood resulting from pregnancy may be the cause of the coagulation. He assigns importance to biological factors due to pregnancy and to venous lesions due to the products of pregnancy circulating in the blood, especially the secretion of the corpus luteum. Thus, the thrombus is one of the expressions of the general toxemia of pregnancy. The viscosity of the blood is increased, there are an increased number of leucocytes and an increased destruction of red and white cells, the materials remaining in the circulation and affecting the walls of the veins. The author does not consider the increase of fibrin important. A study of the viscosity of the blood shows that there is diminished water, and diminished red and white cells, while calcium salts are increased. There is also increased formation of fibrinogen and fibrin ferments derived from destruction of the red and white cells. There is lessened production of antithrombin by the liver. Secretions of the ovary, placenta, and glands of internal secretion may also affect coagulability. Hence in pregnancy we have all the conditions necessary to cause coagulation of the blood. Toward the end of pregnancy pressure increases and causes obstruction to the flow of the venous blood, as is shown by edema of legs and vulva. Aseptic pregnancy thromboses are most frequent in the external saphenous vein at its upper part, especially on the left side. Generally resolution occurs spontaneously, but there is always danger of pulmonary embolism and infection. Preventive treatment by removal of constricting bands and moderate exercise is important. Once the thrombus has occurred rest with the leg raised is imperative, combined with asepsis and heat.

Ileo-cecal Region of the Fetus and New-born.—Francisco Valtorta (*Ann. di Ostet, e. Gin.*, March, 1914) has made a study of embry-

onic structures in the ileo-ceco-appendicular region from the earliest fetal life to birth, with reference to the formation of the various tissues and organs, especially the cecum and appendix. He divided his researches thus: the ileo-ceco-appendicular region from birth to six months of age; the same from six to nine months; the vessels and lymphatics of the region; peritoneal reduplications that may be found in the adult and their interpretation of clinical considerations. The material studied consisted of 128 fetuses from the sixth month up to gestation, and 56 embryos of earlier age. He believes that he has established the following facts. It is not possible to understand the definite disposition of the mesentery without an exact comprehension of the embryological development. The complete disposition of the peritoneum is only the result of a soldering together of the primitive mesentery with the serosa of the posterior abdominal wall. Intestinal movements during the stages of development are simple passive phenomena due to the law of adaptation, through contents and condition of organs. Irregularities of this soldering may be due to various pathological conditions; and variations of location and form may take place in formation of cecum and appendix. Generally when, referring to the mobile cecum, we speak of the mesocecum we mean the last portion of ascending meso-cecum; here excessive mobility of the cecum results from incomplete adhesion of the primitive mesentery. When the cecum in the adult appears beneath the parietal peritoneum and remains without the complete covering of the layers of the serosa, it is necessary to examine attentively for an inflammatory process which might have caused this. In the fetus there is demonstrable a parieto-colic membrane which later may give the appearance of the result of an inflammatory process; this membrane, either more or less high, and more or less complete, may impart to the ascending colon various attachments and by limiting the lumen produce indirectly an obstruction and then a dilatation of the cecal ampulla. The relations of the ileo-ceco-appendicular organs may be various, as may be their location and the attachments of the colon. The appendix may vary in its position with reference to the cecum. Even when the cecum is in the normal situation and the ileum enters into its lateral wall, we may have disturbances in the viability of the intestine due to the first portion of the ileum forming too obtuse an angle with the colon. This may depend either on the fixity of the terminal portion of the ileum by the so-called Lane's ligament or on the exaggerated laxity of the ileo-colic band, conditions which induce modification of the lumen of the ileum and even of the ileo-cecal valve. In the fetus there is no ovario-appendicular ligament, and there are not demonstrable any lymphatic communications between the adnexa of the right side and the appendicular region, nor any vascular connections. Thus the appendix and the adnexa are entirely independent one of the other; still it is possible by the different position of the organs to establish relations of contiguity; lymphatic channels may be established by means of adhesions of inflammatory nature, or it is possible for morbid processes to spread by simple continuity of the serosa. It is probable that

such omental adhesions may extend to the ascending colon, which may be encountered on the operating table, and be the expression of an inflammatory process of fetal life. We may see the clinical picture of chronic appendicitis and have the ablation of the organ give good results when there have been no pathological processes. Here there is exaggerated mobility of the cecum and mesentery with a mesentery so short as to cause painful tension.

The effect of resection of this mesentery results from this and not from removal of the appendix. Thus a surgeon in operating should not simply remove the appendix, but should make an incision sufficiently large to allow of a thorough exploration of the entire region.

Cells of the Colostrum.—Giacomo Cattaneo (*Ann. di Ostet. e gin.*, March, 1914) has made a study of the cells of the colostrum. For this study he utilized the milk of pregnant women, of those in the puerperal state, of those menstruating, of the new-born child, and of women with cystic ovaries. He found that the best specimens were obtained by discarding the first part of the milk, for the best cells came from the depths of the breast. The cells in the first drops drawn were in a state of karyolysis. In one normal cell he found as many as six nuclei. There are several theories as to the production of the colostrum corpuscles. The theory that they arise from desquamated cells of the milk ducts is hardly tenable, as there would be too great destruction of the secreting structures of the gland. Czerny thought that they were leukocytes. The author believes that they are derived from the interstitial cells of the mammary gland. They are indistinctly granular, have an irregular nucleus, are poor in chromatin, and there is an absence of transition forms. These facts would go to show that they are not derived from the blood. The author thinks them lipid granulation cells. In morphology and microchemical reactions they show identity with these cells which are found in the milk tubes, and are identical with the interstitial cells of the gland. There are reasons for placing them among the migrating cells. To these interstitial cells belongs the function of internal secretion.

The Thorax in the New-born.—E. Maurel (*Arch. mens. d' obst. et de gyn.*, June, 1914) tells us that the passage of the thorax although larger than the head, is never by itself a cause of dystocia uteri at delivery. This is because the thorax is so compressible, but at the same time there may be danger to the child from that compression. The author has made a study of the thorax in children by means of graphic measurements which he calls stethography. He finds that in the new-born the form of the thorax is circular, and only later does it become oval. The manipulations at delivery especially in breech presentations may cause lesions of the thoracic organs. The greater mortality of boys at labor is probably due to their greater size and consequent greater compression. The measurements made by the author may have value in eugenics. Their characteristic value depends not only on the actual dimensions but their relations to other conditions. The quantity of radiating skin is much greater in infants than in the adult. Hence the need of calories is greater and

more heat must be supplied to the infant than to the adult. The amount of oxygen reached is also greater. The author insists on the constancy of the relation from birth to adult age between the surface of radiation and the pulmonary surface. Also the importance that the surface of radiation has on the phenomena of life. This regulates our expenditure of energy, and it is to adapt itself to it that the organism modifies not only its thorax but also the digestive and other organs.

GYNECOLOGY AND ABDOMINAL SURGERY.

Determination of the Viscosity of the Blood in Some Tumors of the Uterus and Ovaries.—Gian-Disma Pestalozza (*Ann. di ostet. e gin.*, April, 1914) says that up to the present time no studies have been made of the value of the viscosity of the blood in relation to the gynecological affections. In normal individuals the viscosity of the blood is in relation to the arterial tension. The principal factor in the variability of the viscosity of the blood is hydremia. The venous blood is more viscous in hyperglycemia and hyperuricemia. Holmgren says that the increase of white blood cells increases viscosity, and there is a constant relation between leucocytosis and increased viscosity. During menstrual periods viscosity is changed; it is increased in the premenstrual period, lowered during the flow, and again increases in the intermenstrual period. Profuse perspiration increases viscosity of the blood. In pregnancy it is lower than normal. In observations of this nature it is necessary to exclude all general conditions that would alter the normal viscosity. Three different classes of cases were studied by the author; uterine fibromata, uterine cancer, and ovarian cysts. Of the fibromatous uteri there were 22. Klein has shown that fibroids change the blood condition through toxic products of the tumor, which lessen the resistance of the blood cells. Pressure is here generally increased, and this is also due to toxic products. In the author's cases there was an increase of pressure corresponding to a diminished viscosity of the blood. The cases of carcinoma of the uterus, sixteen in number, showed lowered viscosity of the blood, coincident with lowered pressure. The author's conclusions are that in uncomplicated fibromata of the uterus the viscosity of the blood may be an aid in diagnosis of the tumor from pregnancy. The viscometric value is always diminished, while the sphygmometric is increased. No difference is noted between primiparity and pluriparity. In carcinoma of the uterus the determination of the coefficient of viscosity may aid in clinical diagnosis. There were too few cysts to draw conclusions concerning them.

Amniotic Membrane for Prevention of Postoperative Peritoneal Adhesions.—A preliminary note by C. B. Lyman and W. H. Bergtold (*Surg., Gyn. and Obst.*, 1914, xviii, 762) suggests the use of amniotic membrane for the prevention of peritoneal adhesions. It seems suitable for the purpose because it can be obtained in sheets

of large size, is sterile to start with, is easily preserved and kept sterile, and is thin and probably easily absorbed. The material used was obtained from a patient free from constitutional disease; it was prepared by washing in running water for two hours and then kept in one per cent. lysol solution until needed. The one objection to it is that it is slippery and friable when so prepared. In six other cases in which it was satisfactorily used, the membrane was preserved in one-half per cent. solution of formaldehyde in 70 per cent. alcohol.

Precancerous Conditions of the Involuting Breast.—When the mammary gland undergoes senile atrophy or involution, the connective tissue stroma is increased, the periductal tissue disappears. The blood-vessel walls become thickened and the acini for the most part, atrophy. The resultant contraction of the stroma about the ducts leads to dilatation of the acini and the formation of numerous small cysts. This is the normal process of senile involution in the breast. In a certain group of cases, the cyst formation becomes marked and the epithelium takes on proliferating activity. This group has been referred to as cyst adenoma, polycystoma, chronic cystic mastitis and many other terms, including that of abnormal involution. J. W. Means and J. Forman (*Ohio State Med. Jour.*, June, 1914) say that the proliferating group of abnormal involution is frequently associated with cancer. In our series of twenty cases of cancer occurring in women past middle life, it is associated eight times, or 40 per cent. The proliferating group of abnormal involution has connective tissue increase, blood-vessel obliteration and the consequent disturbed nutrition in common with other precancerous lesions. The development of early malignant change cannot be detected from the clinical symptoms, hence the radical removal of the gland whenever the seat of this disease is indicated. Examination and dissection of the axilla is demanded whenever the proliferation is at all marked.

Results of Conservative Treatment of Cystic Disease of the Breast.—R. B. Greenough and C. C. Simmons (*Annals Surg.*, 1914, lx, 42) define cystic disease of the breast as a diffuse process involving a large part, if not the whole, of the breast or of both breasts, and presenting an increase of the interlobular connective tissue and dilatation of the gland ducts into macroscopic or microscopic cysts. Within these cysts the gland epithelium shows a variety of different conditions, of which we distinguish three main classes: (1) the simple fibrocystic type of the disease with flattened or atrophic epithelium, and two types showing epithelial proliferation; (2) papillary epithelial proliferation; and (3) adenomatous epithelial proliferation. The last class is very near to the line of infiltrating epithelial growth or carcinoma. The writers do not include as cases of cystic disease, cases of the type known variously as "papillary cyst adenoma," "villous papilloma," or "duct cancer," in which gross intracystic papillary growths occur, accompanied often by the discharge of blood from the nipple. This condition they regard as true local tumor formation, and one which has its own, and

indeed a very high, predisposition to carcinoma. Of eighty-three cases of partial operation for cystic disease of the breast reported by them, seventeen, or 20 per cent., were unsuccessful. In four cases carcinoma occurred in the breast tissue left by the partial operation, 4.8 per cent. In five cases the disease recurred only in the other breast, 5.9 per cent. In eight cases the disease returned in the breast tissue left by the first partial operation, 9.6 per cent. The occurrence of carcinoma in cases of cystic disease, estimated at about 10 per cent. of all cases, demands radical treatment in all but the mildest cases. The operation of choice should remove all the gland tissue of the affected side, and, when the disease is bilateral, of both sides. This can best be accomplished by "subcutaneous amputation," leaving the nipple and areola, or by elliptical amputation. Where grave doubt as to diagnosis is present elliptical amputation is to be preferred. Local excision of nodules in the breast, suspected of being malignant, should never be performed. The operation of local excision or partial plastic resection should be restricted to the earliest and mildest types of cystic disease. In such cases plastic resection is the operation to be preferred.

Cure of Cancer of the Uterus.—J. L. Faure (*Presse méd.*, May 2, 1914) thinks that the physician is not justified in his pessimism as to the cure of cancer of the uterus. The author has observed a number of cases which have gone from seven to ten years after operation without any return of cancer of the uterus. One case has remained cured for 10 years, three for 11 years, and one for 15 years. When cancer of the cervix is attacked at the beginning, while the uterus is mobile, and the culs-de-sac are not invaded, and cancerous ulceration is limited to one lip, or to around the cervical orifice without infiltration too high toward the uterine mucosa, cure after operation is the rule. Operation presents no great gravity, and mortality is similar to that of ordinary hysterectomy. When both lips are involved, and the culs-de-sac invaded superficially, but with the uterus mobile a cure is common. In the bad cases we should never despair. There is a difference in curability in the different varieties of cancer. The vegetating form is often not found to be severe after the curette has removed the surface. The interstitial form is less favorable. But the most important sign is the uterine mobility. Every mobile uterus attacked by cancer should be operated upon. Radium has a happy influence, especially after operation, to prevent recurrence. Operated on early and thoroughly cancer of the cervix is generally cured.

Metasurgical Treatment by Radium in Gynecology.—F. Jayle (*Presse méd.*, July 22, 1914) advocates the use of radium therapy in all cases of inoperable or difficult operable cancer. If used before the operation it makes the field of operation better and more clear, and when employed after operation it destroys the cancer cells that may be left in the neighborhood of the tissues that have been removed. A partial operation may be made successful where without it recurrence would have been inevitable. It makes it possible

for old cases that are inoperable to continue life comfortably for considerable periods without pain and hemorrhage.

Simple Lateral Hematometra in Bifid Uterus.—Pierre Moiroud (*Arch. mens. d'obst. et de gyn.*, May, 1914) describes simple lateral hematometra as one of the accidents that is liable to take place in a bifid uterus. The uterus may be didelphous with two separate uteri and vaginæ: pseudo-didelphous, with two separate bodies: bicornuate, with a single neck and two bodies, or with a single body and two cavities, externally apparently normal. Hematometra occurs when there is atresia of one of the uterine cavities. This obstacle to the fluid may be congenital, or acquired. It may develop in the horn of a well-formed uterus or in a rudimentary horn, in which case the cavity will be very small. The clinical picture is signaled by three important signs: menstrual troubles, dysmenorrhea, and the existence of a tumor. Menstruation may be very irregular, there being alternate menstruation in the two sides of the organ. There may be normal menses and a hematometra coincidentally. If the atresia is congenital the trouble will begin at puberty. Severe metrorrhagia may also occur. The dysmenorrhea will be periodical and severe, increasing in amount as the distention of the organ goes on. The diagnosis of the nature of the tumor will be difficult in cases where the uterus shows no outward evidences of deformity. When the trouble develops in a double uterus a tumor of the broad ligament appears, with two phases of evolution, pelvic and abdominal. The cervix is crowded upward and the uterus is so united as to be confounded with the tumor. There is a tumor projecting into the vagina, fluctuating, depressible, and feeling like a collection of fluid. Uterine contractions are present, the tumor becoming hard to the palpating finger. The tumor may increase so as to pass the limits of the pelvis. Examination under ether gives the best diagnostic points. In a rudimentary horn the signs are different. The tumor is small, the dysmenorrhea unilateral. The rudimentary horn may be pediculated, or sessile, or included in the uterine wall. Rupture may result with the increase of the fluid and distention of the muscular wall of the collection, or perforation may occur by necrosis of the wall, and a pyometra result. Diagnosis is difficult and treatment surgical.

Hernias of the Sub-umbilical Line after Laparotomy.—L. Imbert and D. Zwirn (*Arch. mens. d'obst. et gyn.*, May 1, 1914) says that post-operative hernia is not uncommon, due to bad quality of the tissues and the necessity of drainage. Median eversion shows itself generally by a distention of the entire cicatrix with separation of the abdominal muscles. Sometimes there is a true hernial sac under the skin. The sac is surrounded by fibrous tissue, at the portion of the wound where the drainage tube was placed. This portion is less firm than the outer portion because the outer part becomes hardened earlier, and the central portion remains thinner. Such a hernia may be traumatic or spontaneous. The true cause is of course the laparotomy wound, leaving a weakened portion of the abdominal wall. The wound may not have been properly sutured, or infection of the

wound may have taken place. The sac is formed by a diverticulum of the peritoneum. A fibrous ring forms around the hernia and in this distensible ring the intestines may become strangulated. Treatment must be surgical.

Variation of Absorbent Power of the Peritoneum Following Treatment with Oils.—Piero Perazzi (*Ann. di ostet. et gin.*, June, 1914) says that his experiments with injection of the peritoneum of rabbits with various kinds of oils have shown that there is a decreased absorptive power of the peritoneum for infective materials following the use of the oils. This he believes to be due to the blocking of the lymphatics and vessels with droplets of oil, and it lasts until the oil has been absorbed. It also causes, by irritation, an inflammatory reaction with the production of lymph and leucocytes, and this lessens absorption. The exudate forms a protecting wall against the bacteria no matter how virulent they may be. It retards absorption of chemical substances introduced into the peritoneal cavity, and this retardation reaches its maximum in from two to six hours after the introduction of the oil. During this time there is no reaction by the peritoneum: simple mechanical stimulation will increase the absorption of the chemicals. After two days the passage of chemicals is normal in rapidity.

Perfection and Simplicity in Operative Antisepsis.—C. Merletti and C. F. Calcaterra (*Ann. di ostet. e gin.* June, 1914) refer to the methods of antisepsis that have been employed in surgery and say that they all have their disadvantages, and that there is a method much more simple and quite as effectual. This is the use of a combination of 60 per cent. alcohol with ether and lysol, which they have practiced for some time successfully. This may be used for disinfection of skin surfaces, of the operative field, the instruments and the hands. It must not be brought into contact with a watery solution since this lowers its antiseptic power. The authors give the technic of the use of this solution which they call by the name antisepticum. Sutures may be prepared with it. During a period of four months the authors have made use of this solution in 90 gynecological operations and 110 obstetrical operations, the details of which have been given. They have also made bacteriological examinations to test the bactericidal power of the solution. They find that a lysol-alcohol solution of 10 per cent. will kill streptococcus and staphylococcus after contact for three minutes; after five days of action it renders catgut and silk sterile; it kills streptococcus and spores in three minutes; after twenty-four hours it renders sterile silk and catgut inoculated with staphylococcus and streptococcus; the resistance of these materials is not less than those treated by the method of Schmidt.

Pelvic Neuralgias of Genital Origin and Their Treatment.—Macé de Lepinay (*Jour. de méd. de Paris*, July 18, 1914) advocates for the treatment of the obstinate form of pelvic neuralgia accompanied by slight genital affections, not sufficient to require operation, the use of mineral baths such as are given at Neris, where the waters are alkaline, and contain radioactive gases, combined with radium appli-

cations. These neuralgias are often chronic and so severe as to render the patient an invalid. A certain amount of benefit may be had from medicinal and local treatment by hot applications, by tonic action on the nervous and general system, and by various forms of electricity. But the combination applied at Neris is the most effective which the author knows. The waters are hot, and disengage gases formed of carbonic acid, argon, helium and nitrogen. Chemically the waters contain bicarbonates of soda, calcium, and magnesium, silicates of barium, lead, copper, and fluorine, which have sedative effects. With the warm baths are combined douches, and rest in bed. The general condition improves; the congestion of the pelvic organs is relieved; inflammatory remains are absorbed; and there is an anesthetic action on the pelvic nerves. Several courses of treatment may be necessary before a cure is obtained.

Systematic Removal of the Cervical Segment in Subtotal Hysterectomy.—Rouville (*Arch. mens. d'obst. et de gyn.*, July, 1914) has originated a method of removal of the cervical segment left after subtotal hysterectomy which does away with all the disadvantages ascribed to the operation. He describes carefully the technic of this procedure. After the uterus has been removed in the usual way, leaving the cervix behind, he seizes the two lips each with a forceps, with a bistoury divides the junction of the cervix all around almost down to the mucous membrane. Then sutures are introduced which bury what is left of the cervix, separating it from the peritoneal cavity. This prevents later infection of the cervical remains, and hemorrhage is guarded against because the vagina is not entered at all. This operation is both simple and effective.

Wassermann Reaction.—In reporting his experience with the Wassermann and other tests for syphilis, E. J. McWeeney (*Dublin Jour. Med. Sci.*, July 1, 1914) says his observations appear to show that Fleming's method agrees with Wassermann in a majority of cases. When it differs from Wassermann it usually does so in the positive direction. Most of the cases that are positive to Fleming and negative to Wassermann are those of treated syphilitics. The Fleming test would, therefore, appear to be a more delicate indicator of partially suppressed infection than the Wassermann. Too many doubtful results were obtained, however, by the writer, 12 out of 44, or nearly 25 per cent. The results obtained with the Herman-Perutz test were clearly unsatisfactory, and he agrees with the Danish authors when they say that, in its present condition, this test is not to be recommended for clinical purposes. It does not provide a reliable substitute for the Wassermann test.

Nature and Establishment of the Typical Sex-ensemble in the Mammalia.—In a lengthy discussion of this subject, D. B. Hart (*Edinb. med. Jour.*, 1914, n.s. xiii, 12, 101) says that sex is established early in phylogeny by the formation of gametes from primitive germ and sperm cells, *i.e.*, flagellate and non-flagellate, protozoa outside an organism; then follows their lodgment in an organism and ultimately in its sex gland. The human potent genital-duct tract and the opposite sex-duct elements constituting with other structures

the typical sex-ensemble have a maximum-minimum, *i.e.*, probability relation, due to successive polar body losses of the autonomous determinants causal to adult results at maturation, and are recorded in the germ plasma. Natural selection eliminates ineffectual results, and thus a stable condition of the sex-ensemble is reached. Sex is regarded as due to the nature of the heredity cells. Any metazoon with motile heredity cells is male; with non-motile ones it is female. One must distinguish between sex and sex-ensemble. The latter has not only the sex gland but the genital ducts according to the sex, *i.e.*, the Müllerian ducts, part of the urinogenital sinus, the external genitals and secondary sex characters, *viz.* fully developed mammæ, special type of pelvis, hair distribution, etc., in the female, while in the male there is the testis as sex gland (descended), the vas deferens, the prostatic utricle, external genitals with the secondary sex characters, mammæ (rudimentary), pelvis, hair distribution. Further, as part of the normal sex-ensemble we have a minimum of opposite sex-duct elements, a most necessary feature of the normal or typical sex-ensemble, inasmuch as any increase of this minimum necessarily has a diminution of the potent and characteristic tract, and therefore an atypical form of sex arises—what is usually but erroneously described as pseudo-hermaphroditism. We may regard the human genital-duct tract as the result of a series of polar body losses in lower mammals until an ultimate probability result giving a maximum of potent and a minimum probability result ensues. Any increase of the latter would lead to a diminution of the potent organs, what lies at the root of the question of atypical sex (pseudo-hermaphroditism).

Inguinal Operation for Femoral Hernia.—The procedure recommended by G. C. E. Simpson (*Liverpool med.-chir. Jour.*, 1914, xxxiv, Part ii, 294) is that for inguinal hernia until the inguinal canal is opened: the conjoint tendon is retracted upward (and the cord drawn up in the male), and blunt dissection along the inner part of Poupart's ligament shows Gimbernat's ligament and enables the margins of the femoral ring and the neck of the sac to be clearly defined. The transversalis fascia closing the internal ring is divided parallel to Poupart's ligament, except in small herniæ. In these the whole sac can often be drawn out of the ring and converted into an inguinal hernia; but in most cases the peritoneal cavity is opened on the abdominal side of the neck of the sac, the contents are reduced, and the sac is then drawn up and cut away, the opening being sutured well on the peritoneal side of the neck, which is usually broad; the transversalis fascia is also resutured. The femoral ring is then closed; Gimbernat's and Poupart's ligaments are identified, as is also Cooper's pubic ligament. The femoral vein being protected, three or four strong sutures are passed through Cooper's ligament and Poupart's ligament, the inner sutures taking a grip of Gimbernat's ligament in addition, and on tying these the femoral ring is firmly closed. The conjoint tendon is then sutured to Poupart's ligament, as in Bassini's operation for inguinal hernia, and the external oblique aponeurosis resutured. In many cases it will be

found more convenient to pick up with the inner deep sutures, the conjoint tendon, Cooper's ligament and Poupart's ligament, so combining the methods of Lotheissen and Moschowitz. Speaking of the difficulties which may arise in dealing with the sac the writer says that in one case the omentum was so adherent to the sac and the apex of the sac so adherent in the groin, that he ligatured the omentum and sac on the abdominal side and then cut away as much as possible of the rest, leaving the apex still adherent in Scarpa's triangle. In two cases of strangulated hernia it was necessary to nick Gimbernat's ligament, and this can be done readily with the parts in full view, so that an abnormal obturator artery could be readily dealt with. In two cases the bladder was on the sac, and in one it was separated for so much as three inches in order to ligature the sac high up; this case might have been distinctly awkward if approached from below Poupart's ligament. In very stout patients it is necessary to take a specially deep grip of the pubic ligament with the hernia needle, as otherwise the sutures may cut through.

Unusual Symptoms after Oöphorectomy.—Six months after supravaginal hysterectomy and salpingo-öophorectomy for a purulent infection of the whole genital tract, a multipara forty-two years old began to suffer from a loosening of most of the articulations, as nearly as can be stated in the following order: joints of the toes, ankle-joints, knee-joints, hip-joints, wrists and temporo-maxillary joints, and to a less extent the shoulder-joints. This condition caused painful "cracking" of the joints and inability to walk. Massage, the administration of thyroid, and mechanical support for the more painful joints undoubtedly helped her. After examining the blood and urine, Blair Bell concluded that the immediate cause of her condition was a great deficiency of calcium in the blood, due to her inability to absorb a sufficient quantity and to retain it in the tissues. He found the brachial systolic arterial pressure only 110 mm. He recommended the administration of a solution of calcium lactate, together with an extract of pituitary gland; the calcium lactate to counteract any possible deficiency of absorbable lime salts in the food, the pituitary extract (infundibulin) to correct the low blood-pressure. Bell has also found that this substance helps to maintain a high calcium content in the blood and other tissues, partly by lessening the excretion in the urine. In reporting this case, A. P. H. Simpson (*Liverpool med.-chir. Jour.*, 1914, xxxiv, Part ii, 357) says that during the last three months the blood-pressure has been almost constantly between 145 mm. and 150 mm., and the patient has been in better health in every way than for many years. The joints are nearly normal. She has dispensed with splints and can walk with freedom. A cure appears to have been effected. She has taken no calcium lactate or pituitary extract for some weeks. Up to the time of reporting the case the arterial pressure had been taken at least twice a week. It had varied from 110 mm. Hg. at the beginning to 160 mm. after the administration of pituitary extract. On an average it had been maintained at 140 mm. Hg. At this level her condition was most comfortable. If the pressure

fell to 130 mm. the joints began to trouble her: if it rose to 160 mm. she was apt to feel rheumatic pains. This was interpreted as meaning that the lower limit means deficiency in calcium and the upper an excess of calcium in the blood. Any excess in the blood-pressure was easily controlled by stopping the treatment and giving a dose or two of thyroid extract.

Two-stage Operation, Especially in Relation to Treatment of Cancer.—G. W. Crile (*Annals Surg.*, 1914, lx, 57) states that both the immediate and the remote results of certain operations are improved if these operations be performed in two stages, partly because the patients may be too much weakened to endure at one blow the stress of the entire operation and the subsequent physiological adjustment; partly because one stage may prepare the way for a safer second stage; and in malignant cases that the immediate reimplantation of cancer cells may be prevented. The newer developments in surgical technic, by which much of the danger and most of the suffering and discomfort of surgical operations have been eliminated, have enabled the surgeon to fully utilize these advantages of two-stage operations. Critical cases of acute infections of the pelvis, of the appendix, or of the gall-bladder, may be more safely treated by a preliminary drainage, the operation being completed after the margin of safety has widened. Anociation greatly expands the strategic possibilities of opportune surgery and lessens the mortality and morbidity attending critical operations upon heavily handicapped patients. He confidently expects to see the present mortality in stomach and intestinal resections reduced at least one-half by the two-stage operation under the technic of anociation.

Treatment of Inoperable Carcinoma of the Uterus by Application of Heat.—J. F. Percy (*Lancet*, Aug. 1, 1914; *Med. Press & Circ.*, Aug. 12, 1914) says that inoperable carcinoma may be attacked through attempts to destroy the possible cause by vaccines, toxins, serums, etc.; by attempts to change the pabulum by which the disease is permitted to progress; and by the same agents that will destroy the normal cells, such as caustics, chemicals, actual cautery, and freezing. The destructive action of heat upon cancer cells has been shown by various writers; but a method tending to raise the temperature of the whole body above 40° C. (104° F.) is impracticable, because it is dangerous, uncertain, and we cannot regulate it. We are compelled to find some method more local in its application which will exert the greatest destructive process on the gross mass of cancer and endanger, to a minimum degree, the normal connective-tissue cells. The only agents so far found worthy of consideration are hot air, hot water, steam, electro-coagulation, fulguration, and actual cautery. Hot water, hot air, and steam are shown by Doyen to be of no practical value because of their slight penetration. Electro-coagulation affects the tissues for a depth of 5 to 8 cm. in two minutes. The rapidity of action, the difficulty of control of the electrode, especially in the cavities, the complicated apparatus necessary, together with the refinement of technic and specialized judgment required of the operator, make this method impracticable

in the treatment of the cavity carcinoma. The de Keating-Hart method of fulguration, the sparking from a high-frequency current of high tension after the surgical removal of the bulk of the mass, especially when superficial, requires extensive, complicated, and expensive apparatus and demands specialized knowledge, a refinement of judgment that requires more than the average experience. The writer recommends the development of heat through an electric heating iron, which can be regulated by means of a rheostat when applied to the involved tissue. With this electric heating iron and water-cooled speculum and vaginal dilator a maximum penetration and dissemination of heat is obtained in the involved structures. The low degree of heat which experiments show to be more effective than intense heat can be maintained accurately. This low degree of heat does not burn up the cancerous mass. When this degree of heat is maintained for from ten to twenty minutes the cancer cells are absolutely killed, while the normal tissue cells are not injured. The important thing is not to convert the diseased tissue into charcoal. The charcoal or carbon thus formed inhibits the further dissemination of heat not only through the cancer mass but beyond, drainage is prevented for a number of days. This permits of the absorption of a larger quantity of broken-down cancer cells than the average of these patients can tolerate. The heating iron, when used through the water-cooled speculum, should not be hot enough to scorch a pledget of white cotton if laid on the heating iron even for half an hour. No smoke or smell of burning tissues should issue from the speculum, as would occur if they were being carbonized. The ear placed near the speculum should hear only a gentle simmer or bubbling, while the heating head is in the diseased mass. Experimental work, and the operation itself, demonstrate that when this "cold iron" is applied to the affected tissues, not only is there much less destruction of normal cells, but a far greater penetration of heat, sufficient to kill carcinoma. Cancer is destroyed when the temperature in the mass is raised to 50° - 55.5° C. (122° - 131.9° F.), while the vitality of normal tissues is not changed until the temperature exceeds 55° to 60° C. (131° to 140° F.). The basic idea of this treatment is not cauterization, but the production and dissemination of heat in the gross primary mass of cancer. It is not always best to attempt to destroy at one sitting a large mass of carcinoma. A second or even third application of heat is not only safer, unless the involved structures are small, but it gives the operator a much better opportunity to reach finally the outermost confines of the disease. The writer strongly advises against the preliminary use of the curet or other operative measures, for the reason that the heat is distributed through the medium of the pathological overgrowth which we wish to destroy. Heat does not encourage the extension of metastases, while the curet and knife do. Again, scar tissue is not formed after the use of the curet, but it is the usual sequel after the application of the heat, and he has yet to observe the redevelopment of cancer in cicatricial tissue. Where the surgeon believes that a modern total hysterectomy

tomy should be the operation of choice in the less extensive forms of uterine carcinoma, the methods here outlined should precede the final operation at least by three or four weeks. The management of complications, the most serious of which is the prevention of rather late hemorrhages, is a matter of importance. In fifty cases this sequel has followed in two private and in two clinic cases. Only one of these, a private case, has died from the hemorrhage. It will probably prove to be true that the uterine arteries, or possibly even the internal iliacs, should be tied in every case immediately preceding the treatment by heat.

DISEASES OF CHILDREN.

Treatment of Obstetrical Paralysis.—J. J. Thomas (*Bost. Med. and Surg. Jour.*, 1914, clxx, 513) says that such excellent results have been obtained at the Children's Hospital from a system of what he calls educational gymnastics that they have entirely given up the use of electricity in cases of obstetrical paralysis, partly because it is much less effective, and partly because the muscles which need exercises and electrical stimulation the most, namely the spinati, practically cannot be stimulated by electricity because of the overlying fibers of the latissimus and trapezius. The treatment is divided into three parts: 1. Passive movements of the joints, shoulder, elbow, wrist and fingers, best done by someone who knows the anatomical possibilities and limitations of these joint movements. These movements need to be continued until the arm has entirely recovered. 2. Massage, of the gentle kneading form, to stimulate growth, which may be discontinued when the arm keeps up in growth with the unaffected one. 3. Exercises, to induce the child to use the arm, voluntarily, which vary with the age of the child. (a) Under the age of two months one uses gentle irregular movements, carried out by the operator, and by the mother between treatments, such as moving the baby's hand and arm in various directions in imitation of voluntary movements made by the other arm. (b) After two months more definite exercises are employed, accompanied by some nursery rhyme. The details of these exercises are described by the writer. (c) At ten or twelve months of age the child begins to rebel at interference and shows a desire to act independently. From that time till about two years of age it is greatly absorbed in blocks, and it can be induced to reach in all of the directions given in the previous exercises in order to get the block which it wishes. (d) At about eighteen months of age the child can be induced to return to the first exercises with the rhymes, but now done voluntarily, and dumb-bells, wands, balls, bean-bags and such things can be utilized, the same movements being carried out with these objects. At two and a half or three years the child will swing on a bar, walk into the corner with arms spread out, creep up the wall with the fingers and other exercises devised to use the desired movements. The last muscles to develop are usually the outward rotators of the humerus, and the supinators. These often need attention after the arm is

apparently well. The special exercise for this stage is, with the elbow bent at the side, and the forearm in supination and abducted, with a small iron dumb-bell in the hand, the arm is extended in the direction of the line of the forearm.

Diagnosis of Pertussis.—A. Friedlander and E. A. Wagner (*Jour. A. M. A.*, 1914, lxii, 1008) report that they have succeeded in making the diagnosis of whooping-cough in all stages—catarrhal, paroxysmal and convalescent—by means of the complement-deviation test. The technic for the test has been as follows: A small amount of blood taken from the patient's ear, finger or toe in small test-tubes or the Wright capillary tubes, was kept at room temperature or placed in the incubator until coagulation has taken place. Serum was then separated more completely from the clot in the centrifuge. Only the fresh active serum was used, two drops in each test. The Noguchi system was used. The Bordet-Gengou bacillus was obtained in pure culture. Subcultures were made on Bordet's medium, ascitic fluid agar and broth serum. The antigen was made from seventy-two-hour growths in ascitic fluid agar in the following manner: The colonies were washed off the agar with sterile salt water. An emulsion was made, and the bacteria again washed in salt water. From this a standard suspension was made and 0.1 and 0.2 c.c. of this used in the test. Throughout the tests, live bacteria were used. In each test known normal and known positive controls were used. In each series of tests the hemolytic system was tried out in the usual manner, using a water-bath at 37° C. for incubation. After primary incubation for half an hour, the amount of amboceptor indicated by the preliminary test was added to the final test-tubes, and the tubes again incubated in the water-bath. Final readings were taken within the following hour. Positive results were obtained in all of eighteen cases which were whooping, in one not whooping but otherwise typical, and in two out of three in the catarrhal stage, while eight normal all gave negative reactions.

Significance of the Von Pirquet-Reaction in Surgical Tuberculosis of Children.—The object of an investigation by L. B. Robertson (*Bost. Med. and Surg. Jour.*, 1914, clxx, 550) was to determine the reliability of the Von Pirquet reaction in surgical tuberculosis, particularly that of bones and joints. The material consisted of some 350 cases on which the Von Pirquet reaction was tried, collected from the records in the last four years. The children were all under twelve years of age. Of all cases having clinical evidence of surgical tuberculosis, either in bone or soft tissues, 2.9 per cent. showed negative Von Pirquet reactions. In those cases not giving definite clinical evidence of tuberculosis, although some showed enlarged anterior cervical glands and others gave a family history of tuberculosis, 14 per cent. positive cutaneous reactions. In the apparently nontuberculous cases, the reaction is more frequently negative in the younger children, as seen from the following: 0-4 years, 48 cases, positive reactions in 10 per cent. 4-8 years, 61 cases, positive reactions in 14.5 per cent. 8-12 years, 40 cases, positive reactions in 17.5 per cent. The reaction may be regarded as specific, and the

fact that it is positive in a moderately small percentage of clinically nontuberculous children does not outweigh its value as a diagnostic test. From the above figures it must be concluded that the Von Pirquet reaction is fairly reliable in children under twelve years of age, but that it has less significance where the patient shows enlargement of the anterior cervical lymph nodes or gives a family history of tuberculosis.

Hemorrhage Following Tonsillectomy.—F. E. Garland and D. C. Greene (*Bost. Med. and Surg. Jour.*, 1914, clxx, 525) describe the dangerous type of bleeding, the kind which goes on to exsanguination and death, as an ooze. This continues for hours without giving any of the text-book symptoms of hemorrhage. The blood may be expelled by coughing, but the half-conscious patient more often swallows it. Accordingly, unless vomiting occurs, hemorrhage may continue without the slightest evidence. In such cases one should at once reapply ether, and suture the pillars. This process takes about three minutes, and as but little blood is lost, the patient's recovery proceeds in the usual manner.

Etiology of Epilepsy.—A critical study of 175 cases by A. W. Fairbanks (*Bost. Med. and Surg. Jour.*, 1914, clxx, 521) revealed in only twelve instances any trace of convulsive attacks or of petit mal in the ancestors or in other members of the family. Of these epileptic children, whose birth was in some one or more respects abnormal, 70 per cent. presented other evidence of cerebral defect than the epilepsy, and 23 per cent. presented objective evidence of structural damage of the brain in the form of spastic paralysis, and 14 per cent. presented evidence of cranial injury, two of these being spastic. Eight cases were probably syphilitic in origin. Fifteen of the series had suffered cranial injury after birth and antecedent to the appearance of the epilepsy. Twenty-two of the children were perfectly well until the onset of meningitis or encephalitis. Five cases could be traced to an attack of pertussis. In fifty-three cases no definite etiology could be determined. Twenty-three presented evidence of cerebral defect other than the epilepsy. The study of these 175 cases confirms the writer's opinion that heredity is a minor factor in the etiology of epilepsy and that the affection in the majority of instances is the result of acquired cerebral injury from trauma or disease.

Influence of Alkalies upon Gastric Motility.—In a preliminary study of three cases, Mr. Ladd (*Bost. Med. and Surg. Jour.*, 1914, clxx, 518) has made no effort to attempt to judge of the effects of anything but large amounts of alkalies. His observations were made by radiography after administration of bismuth in milk. He says that lime water and bicarbonate of soda unquestionably tend to hasten the discharge of the gastric contents into the duodenum. This effect is sometimes seen in the more rapid discharge of the contents in the first two hours of digestion, but that difference is not as striking as one would expect from the theories in regard to the use of alkalies which have previously been held. The most important point brought out by these experiments is the shortening of the latter

half or the digestive period by the use of alkalis. The effect on gastric motility is, therefore, probably due almost wholly to the action of alkalis upon the casein curd.

Why Sodium Citrate Prevents Curdling of Milk by Rennin.—The addition of sodium citrate to milk in infant feeding is a frequent practice in cases in which the use of normal milk results in the formation of large lumps of tough indigestible curd in the stomach. The favorable results attending such use of sodium citrate have never been explained on the basis of actual investigation. Work previously done by A. W. Bosworth and L. L. Van Slyke (*Amer. Jour. Dis. Child.*, 1914, vii, 298) suggested a chemical explanation of the observed facts and led them to test the matter by an experimental study of the action of sodium citrate on milk. They state that the addition of sodium citrate to normal milk increases the amount of soluble calcium in the milk, this increase resulting from a reaction between the calcium caseinate of the milk and sodium citrate, by which is formed sodium caseinate (or calcium-sodium caseinate) and calcium citrate. The reaction is reversible. The curdling of milk by rennin is delayed by the presence of sodium citrate; when there is added 0.400 gram of sodium citrate per 100 c.c. of milk (equal to 1.7 grains per ounce), no curdling takes place. The curd produced by rennin in the presence of small amounts of sodium citrate (0.050 to 0.350 gram per 100 c.c. or 0.20 to 1.5 grains per ounce) increases in softness of consistency as the amount of sodium citrate in the milk increases. The results of the writer's work indicate that at the point at which rennin fails to curdle milk we have in place of the calcium caseinate of normal milk a double salt of calcium-sodium caseinate; this double salt, when rennin is added, is changed to a calcium sodium paracaseinate which, owing to the presence of the sodium, is not curdled. The practice of adding sodium citrate to milk at the rate of 1 to 2 grains of citrate per ounce of milk appears to have a satisfactory chemical basis in the reaction between the sodium citrate and the calcium caseinate of the milk. The amount added is governed by the object in view, viz., whether it is desired to prevent curdling or only modify the character of the curd in respect to softness.

Gastric Digestion in Infants.—The paper of Mr. Hahn (*Amer. Jour. Dis. Child.*, 1914, vii, 305) is based upon the analysis of ninety-four specimens of stomach contents from thirty-seven infants. He says that the determination of the hydrogen-ion concentration is the only rational method of measuring gastric acidity in infants. The hydrogen-ion concentration, $(H) = 1 \times 10^{-5}$, is the normal reaction of the stomach contents at the height of digestion for infants fed on one-third cream-milk and two-thirds milk. $(H) = 1.0 \times 10^{-5}$ is the optimum reaction for rennet and gastric lipase; pepsin is inert at this reaction. The important processes in the gastric digestion of infants are the coagulation of milk by rennet and the splitting of fat by gastric lipase; the peptic digestion of casein is unimportant for the infant. In infants from one to four months old fed on one third cream-milk the lipase content increases with the age of the infant. In infants from

four to twelve months old fed on two-thirds milk the content of all gastric ferments is greater than in infants from one to four months old on one-third cream-milk.

Scrofula.—C. McNeil (*Edin. Med. Jour.*, 1914, n.s., xii, 324) argues that scrofula is something more than a variety of tuberculous infection. It depends upon an abnormal constitution in which the body shows a hypersensitive reaction to various infective agents, including tubercle bacilli in a majority of cases. This abnormal constitution is that usually known as status lymphaticus. There is some evidence which suggests that the thyroid gland is involved in the constitutional condition which underlies scrofula. This evidence may be arranged under the following headings: 1. The thyroid gland shows marked histological change in certain cases of scrofula examined postmortem. 2. The following points seem to furnish clinical evidence of thyroid involvement. Deficient thyroid secretion may explain the stunted growth in marked scrofula. The hyperplasia of the skin in the seborrhea of the scalp, the overgrowth of the hair seen in the eyebrows, eyelashes, and pronounced lanugo on the general skin surface rather point to excess of some element of the glandular secretion. 3. The therapeutic value of iodine-containing substances in scrofula has been long known and thoroughly tested, especially iodide of potassium and iodide of iron. It has been proved that these substances, together with iodine itself and preparations of the thyroid gland, have a direct action upon the thyroid, and, where it is in a condition of hyperplasia, restore it to a colloid condition. It is therefore arguable that their efficacy in scrofula may be due to their restorative action upon a morbidly functioning thyroid.

Ectopia of the Bladder.—A. Edmunds (*Practitioner*, 1914, xcii, 501) records a case of this condition in a girl of twelve which he treated by transplantation into the intestine. He says that plastic operations designed merely to reconstruct the bladder are unsatisfactory, since at the very best they only afford partial relief; and that transplantation of the ureters is preferable. Transplantation of the base of the bladder is better than the separate transplantation of the ureters because it is easier to perform, and on theoretical grounds is less likely to lead to an ascending infection. This is done better by an intra- than by an extraperitoneal route, inasmuch as it is possible to perform the operation with less interference with the vascular supply of the bladder stump, and to utilize a mobile portion of the bowel. As most of these cases die of pelvic cellulitis, the wound should be left freely open. A hernia may be developed, but this can be dealt with later by an aseptic operation, or may be controlled efficiently with an apparatus.

Schlatter's Disease.—C. Corben (*Practitioner*, 1914, xcii, 591) records a case of traumatic separation of the tubercle of the tibia, known as "Schlatter's disease," or "Rugby knee." This usually occurs between the ages of thirteen and sixteen years and is more common in boys. The case reported was that of a girl of only nine years. It resulted from sudden bending of the knee due to catching

the heel when going down stairs, and the effort to prevent falling backward. The only symptom was recurrent slight lameness and the diagnosis was made by radiography. Recovery followed bandaging and voluntary immobilization of the knee. The injury may occur from direct or indirect violence; but with very few exceptions the cause is the latter, in which sudden and violent action of the quadriceps extensor, such as would occur in recovering lost balance or great efforts in jumping, causes partial avulsion of the tibial tubercle. There is sudden pain in the front of the knee, and loss of power, generally only temporary. Occasionally, there is swelling and effusion into the joint, which may be so severe that the condition is mistaken for fractured patella. In many cases the pain is not severe, the child takes little notice of the injury, and it may be only after some weeks, or even months, have elapsed that medical advice is sought. The pain may be intermittent, disappearing completely at times. It is chiefly felt on movement, but occasionally there is some aching at night. The joint may or may not be swollen; tenderness on pressure over the affected tubercle is practically constant. Usually the tubercle is definitely enlarged, but comparison of the two sides may not assist, for not infrequently both knees are affected in the same person. As a rule, the displacement of the tubercle is very slight.

Primary Carcinoma of the Liver in Childhood.—There are reported in the literature, forty-two cases of cancer of the liver in childhood (under 16), with the majority of diagnoses accurately made. O. L. Castle (*Surg. Gyn. and Obst.*, 1914, xviii, 477) records one of pedunculated primary parenchymatous adenocarcinoma of the liver in an infant, the first case reported where complete surgical excision was done. Good surgical convalescence, with death sixteen days after operation from symptoms of acute enteritis.

Prevention of Infantile Paralysis.—F. G. Boudreau (*Ohio State Med. Jour.*, April, 1914) offers as a summary of his paper the rules of the Ohio State Board of Health, which are, briefly, isolation of the patient and screening to keep out insects. Domestic animals should be excluded from the room. Disinfection or destruction of all discharges, especially the sputum and nasal secretions, and excretions from the intestines. Nurses and physicians should observe the same precautions regarding their hands and clothing as if attending a case of scarlet fever. A modified quarantine should be observed. Other children in the family should certainly be excluded from school. The bread-winner may be allowed to work. Four weeks should be the minimum period of isolation and quarantine, and other children of the family should remain away from school for three weeks after the patient's recovery. When this disease is present in a community, public gatherings which children will attend should be discouraged. Members of the family and those exposed should occasionally use a gargle and spray consisting of 1 per cent. of hydrogen peroxide, under the direction of their family physician. As soon as practicable after recovery of the patient, the house should be disinfected with formaldehyde. Abortive cases are often associated with typical cases, and

the same precautions should be observed with such cases. All cases must be reported to the health officer. Since the disease is infectious prior to the onset of paralysis, suspected cases should be reported and quarantined until the exact nature of the disease is known.

Pituitary Gland in Relation to Epilepsy.—G. C. Johnston's (*Surg. Gyn. and Obst.*, 1914, xvii, 486) investigations total some one hundred cases of epilepsy in which a very high percentage show one or more of these features: overgrowth of the clinoidal processes, distinct increase in density in the bony tissues forming the roof of the orbits, the sphenoidal sinus, and the ethmoidal cells. The gland is handicapped by being encroached upon, its circulation is hampered and its physiological activity mechanically interfered with and diminished, and the epileptoid seizures are wholly or in part the result of the deprivation of the animal economy of those substances necessary to metabolism and produced within the pituitary. If this hypothesis is founded on any truth or fact, then a patient suffering such epileptoid seizures (due wholly or in part to such deprivation) should be partially or completely relieved and made free from the seizures if it were possible to supply artificially that which is lacking and that of which the patient is deprived, due to the partial or complete failure of normal supply from the pituitary. It has been found that the administration of the pituitary extract by the mouth is of distinct value in the specific class of patients under discussion, given in gradually increasing doses while bromide is slowly withdrawn.

Flat-foot in Children.—A. Ehrenfried (*Bost. Med. and Surg. Jour.*, 1914, clxx, 538) says that the diagnosis of weak, pronated or flat foot should not be made inconsiderately. A study of the records of 1000 children under twelve years of age applying consecutively for treatment at the out-patient department of the Children's Hospital, in 1912, showed 440 having some static disability of the feet. In 327 of the 440 cases the foot symptoms were secondary to some other condition, which required treatment. Continued observation in many apparently simple cases showed mild rickets or unsuspected infantile paralysis as a cause, and less frequently such conditions as tuberculosis of the knee, hemiplegia, or lead, postdiphtheritic or spastic paralysis of the primary cases were congenital. These, the result of mechanical influences prior to birth, are more properly classified with club foot. The other primary cases, ninety-five in number, show evidence of muscular insufficiency resulting from physical debility as the leading factor in causation. This debility is frequently the sequel of an infectious disease, and is particularly apparent when the child has been the victim of a series of infections in close succession. Other static disabilities, such as relaxed knees, functional scoliosis, and gastropsois are likely to be present. The secondary cases, which were in the majority, were the result of rickets or of rhachitic deformities in approximately 200 cases, of infantile paralysis in 107, and of other conditions in approximately twenty cases. In many of these the foot disability was a minor incident. Prophylaxis of foot disabilities consists in combating the two important causes therefor, rickets and the infectious diseases of childhood.

Infantile Scorbutus.—J. L. Morse (*Bost. Med. and Surg. Jour.*, 1914, clxx, 504) finds that there has been a rapid and progressive increase in the number of cases of scurvy coming to the Medical Out-patient Department of the Children's Hospital during the last four years. This increase has been not only absolute but also relative to the total number of cases. The proportion of babies fed on the proprietary foods in 1913 was much smaller than in 1905. It hardly seems reasonable, however, to draw the conclusion from this fact that babies fed on milk are more likely to develop scurvy than those fed on the proprietary foods. It seems more reasonable to suppose that something was done to the milk in 1913 that was not done in 1905. It is striking that boiling of the milk was very common in 1913. The writer presents a table which compares the percentage of milk pasteurized in Boston and of the percentage of cases of scurvy to the total number of cases coming to the Medical Department of the Children's Hospital during the last ten years. Since 1908, when the figures for pasteurization appear in this table, the percentage of cases has risen from 0.24 to 0.87 and that of pasteurized milk from 33.58 to 80. These figures suggest that there may be some etiological relation between the heating of milk and scurvy.

Treatment of Pylorospasm in Infancy.—In contrast with hypertrophic pyloric stenosis, which is a congenital condition with distinct organic lesions, pylorospasm is acquired at any age. In the treatment of the latter, J. Ruhräh (*Amer. Jour. Med. Sci.*, 1914, cxlvii, 474) considers feeding with breast milk as of the first importance. If the case does not do well the milk may be partially skimmed. If the supply is inadequate partially peptonized or dilute modified cow's milk may be employed. If these fail, well diluted malted milk or diluted condensed milk may be tried. In severe cases gavage may succeed when vomiting follows nursing or bottle feeding. Small quantities gradually increased and given at short intervals are usually best retained. Lavage once or twice a day is advised. Plain water or salt solution by rectum will relieve thirst and stimulate excretion of urine. Of drugs, atropin is far superior to all others, given in doses of $\frac{1}{2000}$ grain every four to six hours, sometimes more frequently. If no therapeutic effect is obtained the dose may be cautiously increased until symptoms of poisoning appear. If the diagnosis of congenital hypertrophic pyloric stenosis is uncertain, from three to six weeks of such medical treatment for pylorospasm should be tried before deciding upon operation.

Injections into the Jugular and Epicranial Veins of Infants for the Treatment of Hereditary Syphilis.—Germain Blechman (*Ann. de méd. et chir. inf.*, March 15, 1914) says that the injection of salvarsan in infants is difficult on account of fat in the tissues, the inability to get keep the child still during the injections, and other causes. He has made use of the external jugular vein and the epicranial veins with success and has obtained excellent results in hereditary syphilis. For salvarsan he has substituted neo-salvarsan in concentrated solution after the manner of Marfan, repeating the injections in progressive doses. This repetition of doses prevented the

use of the jugular veins, which is in girls undesirable from cosmetic reasons. Therefore he has used the epicranial veins, especially the temporal. They are often very much dilated and easy to find. In three months about 100 injections were made. It is necessary to have good assistants, for the child must be firmly held and there must be no delay for instruments that are not ready. The needles must be specially made, of middle caliber and must not leave any orifice to bleed. The walls of the epicranial veins are thick and rigid. Short needles of platinum of 50 and 60 millimeters are used with glass syringes of 2 centimeters content. The author describes his technic. He finds that the solution has a remarkable effect in destroying the treponomata. From the day after the injection the specific effects lessen; pemphigus, macules, and fissures disappear, the discharge from the nostrils dries up, and epiphysitis repairs. Later the general condition betters, the child gains flesh, loses cachexia, and becomes normal in appearance. The remarkable results obtained show the usefulness of this method of injection.

Prevention of Functional Cardiac Troubles in Children.—Nobécount (*Ann. de méd. et de chir. inf.*, March 15, 1914) says that the physician should be a hygienist and know how to preserve health as well as treat disease. Intellectual as well as muscular work affects the action of the heart. The sedentary life, bad attitudes during school hours, and other things affect the heart action. Prolonged immobilization lessens peripheral circulation, and absence of muscular contraction interferes with the venous circulation. The feeble amplitude of the respiratory movements lessens circulation and interferes with heart action. Bad attitudes lessen thoracic expansion, respiration is badly carried out, stasis and pulmonary atalectasis result. Flexion and torsion of the neck to an abnormal degree interfere with the circulation in the great vessels of the neck. Intellectual work causes dilatation of the carotids, increases the amplitude of pulsations, and heart beats becomes more frequent, and the radial pulse small with high arterial pressure. Strained attention and immobility cause superficial voluntary respiration. The more prolonged these factors the worse is the result. Violent and prolonged efforts with immobilization of the thorax, the thorax fixed in expiration, interfere with pulmonary and general circulation and the veins become dilated, while the contracted muscles compress the arteries and aortic pressure increases. When the effort ceases blood flows back abundantly to the heart, the ventricles contract on a large amount of blood and the heart work is exaggerated. Thus the cardiovascular system undergoes pressure and the heart dilates. If effort is moderate the dilatation soon disappears, if not it becomes more or less permanent. Therefore we see that exercise of the muscles has a beneficial effect on the circulation, but overwork becomes injurious. In the child the circulation adapts itself most easily to changes of muscular tension. The best exercises for children are walking in moderation and games that vary rest with effort. The child is incapable of continuous effort in the same line; therefore long walks are injurious and races should not be indulged in.

The entrance of the competitive into athletics for children is to be deprecated. Bicycling is open to the same objection. In moderation it is a good thing, but overdone may do much harm. Swedish gymnastics are very beneficial but uninteresting. With a normal heart, games are the best form of exercise. Manual work as given in schools is of value as exercise; so are gardening and carpentry. If there is any doubt of the integrity of the heart we should examine it before and after exercise. With functional heart troubles we should not immobilize the child but graduate the exercise to his powers. Hydrotherapy is of much value; massage of the limbs lessens peripheral circulation and rational gymnastics are valuable. Violent exercises should be interdicted, and all exercise should be carried out under the supervision of a competent person. Large hearts are to be found in children suffering from indigestion of various kinds. Here a suitable diet should be combined with rest on the back.

Evolution of Surgical Tuberculosis in Children.—Froelich (*Arch. de méd. des enf.*, March, 1914) says that superficial tuberculosis shows itself very early in life. The port of entry in the infant is almost always the respiratory organs. It is frequent as Pott's disease in babies. There are certain peculiarities in children. Frequency is great in nurslings. Of all cases of tuberculosis from infancy to the sixteenth year, one-sixth to one-seventh are surgical. The maximum frequency is in the third year. The form of tuberculosis in bones and articulations in infants is generally hypertrophic. The fungosities develop, then soften and lastly are evacuated externally, but the period of fistula is of short duration. In older children the lesion is generally epiphyseal. In the baby it often involves the diaphysis. In the hip it often causes early luxations. In the knee there is an acute form of tuberculosis. In the infant tuberculosis is generally multiple such as osteoperiostitis of the skull, etc. The diagnosis has always to be made from syphilis and staphylococcic infections. If the child is in good physical condition cure is rapid and more rapid than in older children. Peritoneal tuberculosis of infants is less grave than in older children. Tuberculosis of the testicle is very frequent in infants. Its evolution is often acute and ends so as to simulate congenital cryptorchidism. The surgeon should be very conservative in his treatment of surgical tuberculosis in the infant and child. Puncture to let out pus, expression of caseous fungosities through the fistula, and incisions are in order. More rarely liquid injections or ignipuncture may be used. Radical operations such as resection, amputation, and castration are seldom necessary.

Heliotherapy.—Delachaux (*Ann. de méd et de chir. inf.*, March 15, 1914) says that heliotherapy should be carried out with the most careful supervision. The body is exposed only very gradually to the sunlight, beginning with the feet, and only exposing them for a few minutes at first. Too long exposure causes fever, palpitation, congestion, insomnia, and nervous excitation. The most difficult time in a heliotherapeutic treatment is the beginning. The ends of the nerves in the skin must have time to become accustomed to the

effects of the sun. It should be used only in chronic cases, and several months must be occupied in the treatment to obtain any good result. The skin becomes thicker, brown and more supple. New capillaries appear in its surface, and in spite of rest the muscles increase in volume and strength. Digestion and appetite improve; stools become regular; sensibility is lessened. Those subject to bronchitis lose the tendency to take cold. Weight generally remains stationary; seldom it increases. Increase in weight results not from growth of fat alone, but from development of skin and muscle as well. On the digestive system the treatment has an antispasmodic effect, and the intestinal peristalsis is regularized and stimulated. The most characteristic symptom of catarrh is the increase in size of the lymphatic glands. There is an increase in the number of lymphocytes. The maladies of the respiratory system are not an especially good field for heliotherapy. In the cardiovascular system heliotherapy acts as a dilator and regulator of the peripheral circulation. The effect of the sun as a stimulation of the genitourinary organs is well known. Effects on the nervous system are complex and varied. Heliotherapy properly applied restores the equilibrium of all the physiological functions. It is especially active in all scrofulous affections.

Treatment of Hemorrhagic Conditions in the New-born.—

L. J. J. Commiskey (*L. I. Med. Jour.*, 1914, viii, 184) says that the treatment at present used in the Kings County Hospital is as follows: It consists of the subcutaneous injection of normal human whole blood. The blood is usually taken from a vein of the forearm by means of an exploratory syringe and is injected into the tissues of the infant's back, before it has had time to clot. The quantity used is from 20 to 30 c.c. every six to eight hours. The blood is generally obtained from one of the parents or relatives. The advantage of whole blood is that it can be easily and quickly obtained, can be used immediately and requires no complicated apparatus. Since hemorrhage in the new-born is due to apparently different conditions it seems an advantage to inject whole blood which contains all the elements essential for coagulation. The blood is quickly absorbed—usually in from two to four hours. In no instance has there been any harmful influence. Transfusion requires a great degree of surgical skill which cannot be obtained at all places and at all times. In the type of case with profuse and as a rule rapidly fatal hemorrhage no treatment except an immediate transfusion can offer any hope. In the majority of cases which are not of the rapidly fatal type it would seem preferable to use whole blood as the initial treatment and to continue its use if beneficial. If after a fair trial, however, the hemorrhage is not controlled, an immediate resort to direct transfusion would be indicated.

Tay-Sachs Amaurotic Idiocy.—G. E. Price (*Jour. A. M. A.*, 1914, lxii, 1545) reports a case of Tay-Sachs amaurotic idiocy on account of a positive Wassermann reaction having been obtained from the patient's blood serum, and the possible bearing this may have on the etiology of the affection.

Auricular Flutter in Rheumatic Carditis.—G. A. Sutherland (*Proc. Roy. Soc. Med.*, 1914, vii, Sect. Study Dis. Child., 133) has recently met with two cases of acute rheumatic carditis in which there was apparently an abnormal rhythm of the auricles, and which was recognized on taking a venous tracing in the neck. The auricular rate was greatly accelerated, while the ventricle did not share in this acceleration. In the cases referred to, the auricular and ventricular rates were perfectly regular. Taking into account the rapidity and the regularity of both auricular and ventricular contractions, the writer is inclined to trace the slower ventricular rate not to any interference with the conductivity of the junctional tissues (heart-block), but to an inability on the part of the ventricle to respond to each auricular stimulus owing to the extreme rapidity of the auricular contractions. In one of his cases the auricular rate was 280 and the ventricular 140. Three days later they were equal, 105 per minute. In the second case the auricular rate was 390 and the ventricular 130, while the tracing also showed the pulsus alternans. The presence of auricular flutter is often lateral and unsuspected. The author suggests that attention be paid to the following possible indications of the presence of this abnormal form of rhythm: (1) Attacks of cardiac asthma (great dyspnea) occurring suddenly and without accompanying variations in the cardiac condition. (2) A triple or galloping or cantering rhythm heard on auscultation. (3) Pericarditis without effusion and with great respiratory distress. (4) Dyspnea, cyanosis, and enlargement of the liver out of proportion to the physical signs of disease in the heart. (5) The presence of the pulsus alternans. Further investigations will be required to determine whether in cases of acute carditis a disordered rhythm of this nature is often present. If it is found one would be more hopeful of the treatment, for a disordered rhythm will respond to treatment by means of digitalis much better than will a ventricle weakened by acute inflammation or toxemia. If we can control the rhythm we shall place the patient in a much better position for weathering the attack.

Use of Antiscarlatinal Vaccines.—Mathilde de Biehler (*Arch. de méd. des enf.*, March, 1914) details the results obtained by the use of the antiscarlatinal vaccine of Gabritchewsky, which is made from several samples of scarlatinal cultures combined, the cultures being sterilized by heat. The Russian authors have found a certain amount of local reaction, in the shape of redness and swelling at the site of injection. There were sometimes fever, headache and eruption. Roszkowski and Czarkowski observed the following results: Small doses of the vaccine do no harm; it may be used as a prophylactic; it immunizes infants if they have not been injected in the period of incubation. The doses should be much smaller than were at first proposed. Revaccination should be made as early as the fourth day, especially if an epidemic is present in the community, being guided by the reaction as to when immunity is perfect. Even if injected in the incubation period it makes the disease milder. The author's personal observations extend over

forty-eight vaccinations in sixteen cases last year, and twenty the previous year. She has observed a slight reaction in some cases, pain and swelling at the site of injection, and slight general malaise. Of all her cases two had scarlatina, but in a light form.

Bacteriology of the Posterior Nasopharynx in Scarlatina and Treatment of the Disease by Vaccines.—N. S. Ferry (*Med. Rec.*, May 23, 1914, 934) presents a bacteriological study of the so-called *Micrococcus* "S" described by E. C. Schultze as present in smears from 459 out of 555 cultures taken from the throats of scarlatina patients.

E. C. Schultze and L. A. Goldberger (*Ibid.*, 931) record the results obtained in 128 cases of scarlatina treated with vaccine prepared from this organism, from streptococcus or these combined. In addition to the vaccine injection all received a preliminary course of eight or ten doses of calomel, 1/10 to 1/4 gram and castor oil or citrate of magnesia, and also had their throats swabbed with a 10 per cent. solution of carbolic acid in oil, and their bodies rubbed with a 10 per cent. solution of eucalyptus in oil, as advocated by Robert Milne. They noted rapid improvement in most of the cases treated, the temperature falling by crisis and not by lysis. Notwithstanding the fact that many patients were out of bed and on a full diet early in the course of their disease, there were comparatively few complications. Very few secondary contact cases developed, possibly due to the swabbing of the throats of the healthy members of the family as well as of the diseased. The spread of scarlet fever could probably be kept under better control and the number of cases greatly reduced if all school children were examined by the proper health authorities at the beginning of each school term and in relays during the school year. Cultures should be taken from their throats and examined for *Micrococcus* "S" as well as Klebs-Loeffler bacilli; all suspicious cases to be excluded and isolated until further cultures show no more *Micrococci* "S" or Klebs-Loeffler bacilli present.

Working with these vaccines, G. I. Kieffer and N. S. Ferry (*Ibid.*, 936) report their results in 106 cases of scarlatina as well as its prophylactic use in the Herman Kieffer Hospital. It appears that the vaccines which contained the streptococci had an advantage over the ones containing the *Mic.* "S" alone, as well as over the usual expectant treatment which was previously carried on in the institution. As a prophylactic, the *Mic.* "S" vaccine was apparently of more possible value. Since its introduction as a prophylactic measure among all nurses who had not already had the disease, not a case has been reported; also, during a period of three months when the prophylactic treatments were discontinued, four out of about twenty nurses became infected.

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ORIGINAL COMMUNICATIONS

TRANSACTIONS OF THE
AMERICAN ASSOCIATION OF OBSTETRI-
CIANS AND GYNECOLOGISTS.

*Proceedings of the Twenty-seventh Annual Meeting held at
Buffalo, N. Y., September 15, 16 and 17, 1914.*

The President, CHARLES NORTON SMITH, in the Chair.

The meeting was opened by an address of welcome by the HONORABLE LOUIS P. FUHRMANN, Mayor of Buffalo. This was followed by an address in behalf of the Profession of Buffalo by Dr. John H. Pryor, President of the Academy of Medicine. Responses were made by the Vice-Presidents of the Association, Drs. Hugo O. Pantzer, of Indianapolis, and J. H. Branham, of Baltimore. The Scientific Session then began by the reading of a paper by Dr. Carstens which follows:

THE NECESSITY OF CONSTANTLY LOOKING FOR
CANCER OF THE UTERUS.*

BY

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Detroit, Mich.

(With two illustrations.)

CANCER is increasing at a terrible rate. It does not seem that a more careful diagnosis is the cause of the statistics showing more cancer now than formerly. I well remember how we made the diag-

* Read at the Annual Meeting of the American Association of Obstetricians and Gynecologists, Buffalo, September, 1914.

nosis of cancer of the abdominal organs, for instance, of the stomach, liver and intestines, without postmortem or microscopical examination, and do not think that we erred any more than now. If my contention is right, it certainly behooves us to be especially careful in the early diagnosis.

In the present state of our knowledge we can do little for our patients, unless we make the diagnosis when the disease is still circumscribed and when it can be eradicated with the knife. Knowing absolutely nothing of the cause of cancer, nor of remedial agents that will stop its development or cure the disease, we must depend upon surgery in the early stages. It is claimed that irritation is one of the causes, but I have always held that irritation has nothing to do with it directly. The parts of the system of certain individuals, subject to most constant irritation, are never affected by cancer; still, I grant, that parts irritated have an aberrant circulation and that the latter may facilitate the development or deposit of cancer. Nor do I want to discourage the removal of all irritants, little ulcers, warts, nevi, etc.

What I plead for is that we should be constantly on the look-out for cancer and suspect it in every case of uterine disease. If one woman out of eight dies of cancer, it certainly behooves us to be on the alert. It disgusts me to see and to hear of curetting in these cases. Women are curetted, no matter for what purpose, they recover from the operation, pay their bills, and that is the end of it. *The tissues removed are thrown away*, and that is the end of it. Now, this to me is a *most vicious thing*. Every general practitioner uses the curet, but few take the pains to examine carefully the tissue removed under the microscope for the purpose of determining the pathological character of the scraping. No matter whether the curetting be done for a supposed miscarriage, for an excessive hemorrhage, or for an irritating discharge, or whether it is done in an old or in a young woman, in *every case a microscopic examination should be made to ascertain the absence or presence of cancer*. You may not find it often; but when you do, you may be able to save a life. In quite a few cases, I have removed the so-called "plug" when operating for lacerated cervix, and found cancer. Removing the uterus a week or ten days later, the most careful search would find no cancer cells; so I really removed the uterus when it was not necessary. But such cases are quite rare. In most of the cases you find cancer cells somewhere else, which would soon develop to a degree beyond the ability of cure. The same conditions we observe sometimes after curetting followed by cauteriza-

tion with some powerful caustic, like zinc chloride or nitric acid. The "curetting" may reveal malignancy but none may be found in the uterus removed a short time afterward. This proves that we can, occasionally, remove all the cancerous tissue by comparatively simple means, if an early diagnosis is made.

I have written and talked on this subject until it is considered a hobby of mine. I submit to this unjust stigmatization, but I consider the question of uterine cancer so vital that I shall continue to talk and write on this subject until every general practitioner is aroused to a sense of full realization of this terrible state of affairs, and until he, like myself, is accused of having cancer on the brain.

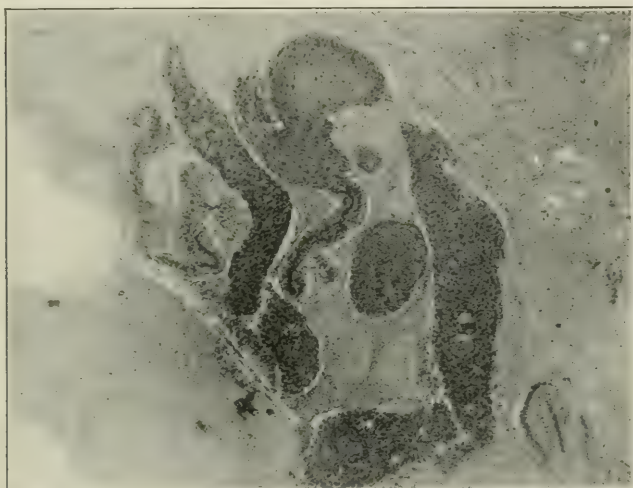


FIG. 1.—Microphotograph of the curettings of the case of Mrs. S.

We have always talked about the cancer age as ranging from thirty-five to forty years and upward. We now know it may occur much earlier, indeed at any time of life. During the last few years, I have seen quite a few women at twenty-three, twenty-five, twenty-seven and twenty-eight years, having cancer of the uterus. In fact, I have had one case not yet twenty-one, who had cancer of the womb, and when I saw her the first time she was hopelessly lost to the disease. It makes our hearts ache to see a young woman, just married, with such a terrible disease.

As an example, I will cite one case and show you the pictures.

Mrs. S., aged forty, no children, history good, has had a disagreeable irritating vaginal discharge for some months, and has been

treated by douches and local applications. I suggested a curetting. She went to Harper Hospital. I curetted her, and removed but little tissue. There really seemed little the matter with the mucous membrane. I had the scrapings examined by Dr. Plinn F. Morse, our pathologist, who pronounced the disease cancerous. I had her returned to the hospital ten days later and removed the uterus. Dr. Morse examined the organ carefully and, at first, he could not find any cancer cells; all at once he found a little nest of which I have here a microphotograph. This case shows beautifully how we can make the diagnosis easily and save the woman's life simply by being constantly on the lookout for this disease.

In conclusion I would say:

First.—In every case of curetting the tissue removed should be carefully examined. If for miscarriage, examine for placental tissue, and *beginning of deciduoma malignum.*



FIG. 2.—Microphotograph of the section of the uterus removed, from the case of Mrs. S.

Second.—If curetting is done for hemorrhage you want to know if the hemorrhage is due to disease of the mucous membrane, or other conditions of the uterus or of the body in general. If curetting is done for an irritating discharge, you want to know the pathologic changes in the mucous glands. In fact, the main thing is *that you want to know.*

Third.—In every case of curetting the tissue removed must be carefully examined microscopically. In every case of trachelor-

rhapsy the tissue removed should be examined in the same way for cancer.

Fourth.—The age of the patient is of no importance, old or young; all tissues removed should be subject to the same careful microscopic examination.

620 WOODWARD AVENUE.

DISCUSSION.

DR. JULIUS H. JACOBSON, Toledo, Ohio.—I hope Dr. Carstens will keep up his efforts of impressing upon the medical profession, and women's clubs especially, the importance of the early recognition of cancer of the uterus. I am sure, this is one of the great problems which we as gynecologists have to solve. I am reminded of a similar movement which was systematically carried out a few years ago in Germany. Midwives and nurses were instructed in the early symptoms of cancer of the uterus. It has always seemed to me that if we would impress and teach the nurses in the hospital training schools regarding the symptoms and importance of the early recognition of all forms of cancer, we would accomplish much toward informing women of the early signs of this disease. It is a common experience with every surgeon to have women come to him when the cancer is so far advanced that nothing can be done. There is much confusion in the minds of gynecologists and surgeons throughout the country regarding the curability of cancer of the uterus. Opinions vary from those of extreme pessimism to those of extreme optimism. Cancer of the uterus can be cured by timely and thorough operation, in a much larger per cent. of the cases than is generally supposed.

There are three forms of cancer, cancer of the cervical canal, cancer of the vaginal portion of the cervix, and cancer of the body, each variety having different degrees of malignancy. The least malignant of all such cancers is that of the fundus of the uterus, which may be classed as the second most favorable cancer (cancer of the larynx being the most favorable). Cancer of the body can be cured in more than 75 per cent. of the cases by an early hysterectomy. On the other hand, there is cancer of the cervical canal, the most malignant of all uterine cancers, this form you cannot cure by a simple operation, a most radical operation is here necessary. Cancer of the vaginal portion of the cervix, in its relative malignancy stands between the above two forms. The lack of a proper understanding of the relative malignancy of these three forms of uterine cancer, has led to the confusion regarding its curability by means of the cautery, as recommended by Bryne and others. In reference to the early diagnosis, cervical induration or thickening is most important. If we feel an abnormal induration we can remove a piece of it and subject it to microscopic examination. Cancer of the body although least malignant, is more difficult to diagnose early because the growth is not visible, and the symptoms are more or less masked. The principal symptom here is usually hemorrhage. The uterine curet with a

routine microscopical examination of scrapings will make the diagnosis early for us in such cases. At the Providence meeting of this association, I reported a case in which hysterotomy failed to reveal a beginning cancer.

DR. CHANNING W. BARRETT, Chicago.—In visiting Detroit some months ago I had the opportunity of seeing the Harper Hospital Laboratory. We were studying interesting specimens and this one was shown me. It emphasizes the necessity of examining a good many slides because the first slides did not show cancer, as Dr. Carstens has stated, and then finally a slide that showed these carcinomatous nests was found.

This paper emphasizes not only the great necessity of early diagnosis of cancer, but the absolute need of having such an arrangement as Harper Hospital has at the present time, namely, a trained pathologist in connection with the surgical work so that all tissue may be examined.

I would not be quite inclined from the viewpoint of development of carcinoma in places of irritation such as carcinoma of the lip or carcinoma of the pylorus or cervix, to lay as little stress as Dr. Carstens did upon the point of irritation as an etiologic factor. We will probably find out some time that there is another cause, perhaps a parasitic cause, but as yet it cannot be doubted, it seems to me, that irritation does play a rather important rôle.

DR. FRANK D. GRAY, Jersey City, New Jersey.—I wish to request Dr. Carstens in closing the discussion to elucidate a remark which he made with reference to this matter of irritation. If I understood him rightly he stated that the portions of the body most subject to irritation were the least subject to the development of cancer. I want him to explain that point in full.

DR. GORDON K. DICKINSON, Jersey City, New Jersey.—Dr. Deaver and myself stand alone in exploiting the value of diagnostic hysterotomy. Dr. Carstens spoke of the pathologist finding cancer cells and of making the diagnosis. How many times have we, in trusting our pathologists, have a report sent back to the effect "nothing found," and afterward have discovered carcinoma?

I agree with Dr. Carstens that we should make the diagnosis early if possible, and I do not see any reason why, when we are suspicious and when the clinical and pathological proof is wanting, we cannot bring the fundus down into the vagina, split it, and examine the interior of the uterus, and remove a piece, if necessary, instead of relying too much on the curettings.

DR. CHARLES L. BONIFIELD, Cincinnati, Ohio.—The importance of the early diagnosis of cancer cannot be exaggerated, and although there is some question as to the advisability of teaching the laity the symptoms of cancer or anything else, yet some good may come from it. The average woman has dread enough of cancer. Jerome K. Jerome said that after reading a medical text-book he had everything described in it except housemaid's knee.

I believe that was very much the case with most of us when we began the study of medicine. I do not think it is wise to keep

harping on the symptoms of cancer to the laity themselves because they cannot make the diagnosis under any circumstances. But what is necessary is to teach married women who have had children the necessity of going to a gynecologist occasionally to be examined just as we go to a dentist to have him see whether our teeth are sound or decayed. If it is worth while to pay money to save teeth, it is equally worth while to have some competent person to determine whether or not a woman is suffering from cancer.

The value of curetted scrapings depends upon how thoroughly the scraping has been done and how many slides a man makes. It is easy to overlook cancer. No gynecologist of experience would think, if bleeding persisted after curettage, of not investigating further. Personally, it is seldom I explore the uterus either by finger or by sight to make a diagnosis.

DR. CARSTENS (closing).—My paper was written largely for the benefit of the general practitioner. I need not emphasize what I have said to the members of this Association. I simply wanted to again stir up the members, so that when they go home they will point out to the general practitioner the importance of not throwing away the curetted material and say that is the end of it. When you curet or operate for a lacerated cervix the tissue should be carefully investigated to see whether or not it is cancerous, and the point I tried to bring out was you can find cancer when a woman is twenty-one or twenty-five and not only when over forty years of age, and it is not only necessary to do it after forty, or the so-called cancer age, but earlier. You must look for the disease earlier than you do now.

My friends Dr. Deaver and Dr. Dickinson can split the uterus all they like for the purpose of making a diagnosis, and yet they may never find cancer by looking at it. In the case I reported there was a good seemingly healthy uterus and everybody thought so who saw it. I was accused of removing a healthy uterus, but it was cancerous just the same.

As far as irritation is concerned, I mentioned that as a kind of bait, thinking somebody would bite, and my friend Barrett and some of the other gentlemen did bite. *Irritation does not produce cancer, never can, and never will.* If by coincidence there is a place that is irritated and cancer develops, there is some other place where cancer developed where irritation does not exist. I will tell you where there is irritation. You will see men wearing glasses whose noses are irritated, or the skin of the nose is irritated, it is pinched, and I challenge anybody to show me a single case of cancer that started in such a place. I do not know how many men wear trusses in this country or all over the world, but if there is any place that is irritated it is that place where a truss is applied. It has got to be very tight to the skin to hold the hernia in place. The skin is constantly irritated and yet nobody has seen cancer develop at such a point.

There are lots of people who have corns, and if there is anything that is irritated it is the little toe, and toes are irritated and irritated and yet cancer does not develop in them. Did anybody ever see a

cancer develop in a toe from irritation? I think I have clearly shown that irritation has nothing to do with the development of cancer. There is *something back of all that* that causes cancer, and let us get away from the idea that it is irritation.

ABDOMINAL DISTENTION FOLLOWING OPERATIONS UPON THE PELVIC VISCERA.*

BY

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THE subject I have chosen is rather commonplace. In presenting it, I may offer the excuse that it has been my aim to make the immediate postoperative period for my patients as comfortable as possible. The distress caused by abdominal distention in patients subjected to laparotomy is often such that some measure for relief must be instituted. It is not uncommon to hear a patient, who is to undergo a laparotomy, ask the question: "Doctor, am I going to suffer much with gas pains?" The laity seems to be fairly well informed on this point. My efforts to bring about a comfortable convalescence after a laparotomy have been somewhat disappointing. The greater number of patients (about 65 per cent. is a fair estimate) have given evidence of abdominal distention with resultant pain that demanded measures for relief. Some patients suffered more than others. In some the distress was of short duration, while in others it was prolonged into a period of marked exhaustion.

In former years I attributed this condition to the improper preoperative care of the patient, and to a lack in surgical proficiency. During later years, however, when no doubt could any longer be entertained as to the proper preoperative care of the patient, and when an increased amount of work, together with better opportunities, made it possible to master certain shortcomings in the surgical technic, I find that but little has been added to the comfort of the patient who has been subjected to a pelvic operation.

It may be stated here that not only does this abdominal distress follow pelvic work, but it may also manifest itself in any and all abdominal operations, even including operations on the kidneys, which are extraabdominal organs. The surprising feature of this abdominal distention is that it may manifest itself with the greatest discomfort in an operation of a lesser magnitude, whereas in an operation of

* Read at the Annual Meeting of the American Association of Obstetricians and Gynecologists, Buffalo, September, 1914.

greater magnitude, and where such distress might be expected, the postoperative period may be surprisingly free from this phenomenon.

Abdominal distention immediately following an operation often receives but a passing notice from the surgeon. There may be conditions, however, when abdominal distention may assume such proportions as to become a serious matter, and strenuously tax the diagnostic ability of the surgeon as to the correctness of his diagnosis.

Can an uncomplicated abdominal distention following a laparotomy menace the life of a patient?

When the factors at work are fully taken into consideration, this question must be answered in the affirmative. In any event, the condition must be looked upon at all times as sufficiently serious to demand immediate measures for relief. Unless such measures are successful, the patient is in great danger of perishing from toxemia or exhaustion.

It has been a debatable point with me how to properly designate an abdominal distention immediately following a laparotomy, so that its gravity may be more fully appreciated. Paralytic ileus appeals to me as appropriate, because it carries with itself the more serious meaning of the word "ileus." The cause of paralytic ileus, as we meet with it most frequently clinically, is the result of peritoneal trauma. A septic condition is also a common factor; it is, however, not the object of this paper to embody the infection ileus in this argument.

When we say that the cause of paralytic ileus is due to peritoneal trauma, what do we mean? We simply mean that the insult the peritoneum has been subjected to operatively has shown itself in a reflected action upon the small intestine through its delicate sympathetic nervous system, principally through the nerve cells in the plexuses of Auerbach and Meissner. If the trauma to the peritoneum has been gross and extensive, reflexes of an intense character, with their concomitant sequelæ, may be engendered.

How is such a trauma usually inflicted? The invasion of the abdominal cavity invariably means injury of some sort and in some manner to the peritoneum. The surgeon consoles himself that with utmost gentleness in his manipulations of all visceral organs, with sharp dissections and with an acute precision in reaching his objective points, he will be able to minimize the dreaded abuse to the sympathetic nervous system. A pelvic operation, however, is not infrequently one of great magnitude, and the invasion often one of great severity. Gross manipulations may become imperative, carrying with themselves a trauma with the resultant paralytic ileus. The

danger that lurks in the so-called "spreaders," so often used to keep the abdominal walls retracted during an operation for an hour or more, can well be determined during convalescence. The packing away of the intestines with swabs of gauze, or with towels, no matter how gently performed, is always an irritating process, it is a minute trauma. The freeing of adhesions either with the gloved hand, or with gauze, is a serious trauma to the peritoneum.

The severe handling of the mesentery, the ligation of a pedicle, the application of a mass ligature, and the placing of sutures add their quota of injury to the peritoneum. Finally, should the patient's condition, on account of oozing from a denuded surface, demand a gauze packing, we introduce into the abdominal cavity one the greatest factors responsible for a peritoneal trauma.

The influence transmitted to the intestinal tract by these intrapelvic manipulations is purely reflex in nature, having in its wake either a complete cessation or a partial inhibition of the motor power. Small segments of the intestine may be involved in the paralysis, or the whole of the small bowel may be greatly distended and filled with fluids and with gases. When such a condition exists, neither feces nor flatus are passed. If an enema be administered to such a patient, it is often retained, or is returned with little force and without result in flatus or feces, except perhaps such as may be washed mechanically from the rectum. When we reflect how complicated and extensive the mechanism of intestinal peristalsis is, consisting of a complex neuromuscular apparatus with a large vascular supply, and requiring for its production the integrity of the whole muscular and nervous apparatus of the intestine, it can be readily appreciated how coils of small intestine in a state of marked distention can readily throw this mechanism out of gear. Should such a condition not subside or fail to be relieved, an aggravation of the existing distress ensues, and a toxemia results. This toxemia is the result of stasis of the intestinal contents. Such contents not only consist of the food taken, which is usually very little, but also of the secretion of the various digestive glands. As an instance of the amount of glandular secretion that finds its way into the intestinal tract, it can be said that the salivary secretion alone amounts to one to two pints in twenty-four hours. When there is added to this the secretion of the gastric, biliary, pancreatic and intestinal glands, it can be appreciated how readily a flooded state of the intestines can be brought about.

A stagnant state caused by the arrested peristalsis becomes still more aggravated, because the normal process of absorption of the liquid is interfered with, none of the fluids, on account of the inhib-

ited power of the intestine, being able to reach that part of the bowel where this physiological process takes place.

In the presence of such an inviting pabulum, the invasion of hostile bacteria becomes a matter of a very short time. Myriads of proteolytic, anerobic and endogenous microorganisms harbored in the intestinal tract act upon food products, especially the proteins, amino-bodies and the resultants of a faulty metabolism, forming toxic products known as indol, phenol, skatol, osmotic oxyacids, para-cresol compounds, hydrogen disulphide, acetone and diacetic acid. These poisons have a deleterious effect upon the peripheral nerves of the intestine, causing a paralysis in severity conforming to the portion of bowel involved, and to the virulency of the bacterial flora that are present. Should there be no favorable influence at work at this stage to antagonize the further invasion of hostile bacteria, the paralytic ileus will become more progressive. The distended and lengthened intestines, which have been forced into folds, will find it difficult to overcome their angulations; the sudden rise of intra-abdominal tension will interfere with the circulation, and the gases will no longer be absorbed from the intestinal lumen.

As a secondary result of interference with the circulation, a diffuse paralysis caused by the poisoning of the neuromuscular apparatus with toxins found in the stagnant contents will end in marked distension of the gut. We are here approaching a very critical stage of this clinical picture. Assuming that the bowel distension has been progressive, with absolute constipation lasting about five days, it can be expected that the cardiac and respiratory functions will begin to show marked embarrassment. It is very evident that under the strain of the pent-up gas the muscular wall of the intestine is being thinned out, thus robbing it of much of its resisting power. The lowered vital tension can no longer act as a barrier to the hostile microorganisms, and they are free to pass from the lumen of the exhausted intestine through the wall to the peritoneum, giving rise to the most grave postoperative sequelæ, peritonitis and infection.

The recognition of a paralytic ileus does not present any difficulties. It is only when the factors at work seem progressive with apparently no relief in sight, that a feeling of doubt may obsess the surgeon whether or not the condition might be one of mechanical ileus. A careful observation of symptoms and physical signs made from the hour of operation will be of much value in aiding the surgeon in the correct interpretation of the existing condition.

The onset is gradual and usually manifests itself within the first twenty-four hours after the operation. There is absolute constipa-

tion. The patient shows marked restlessness and complains of pain in the abdomen. This pain is diffuse and has the characteristics of an old-fashioned wind colic, being cramplike, twisting or binding. At first, it only gives rise to periods of discomfort, associated with the rumbling of wind which will not pass downward. Later on definite attacks of colic occur, and these become more frequent and more severe. At times, the pain is intense, causing the patient to place his hands upon his abdomen and cry out. He makes an effort to expel the flatus, but is unable to do so, excepting the small quantities of gas that have been forced into the large bowel by pressure.

Palpation of the abdomen reveals a uniform distention with the abdominal muscles more or less on the defensive. There is usually an elevation of temperature of 100° and a fraction, with an accelerated pulse, from 110 to 120. At the onset the general condition of the patient appears good. As the distention becomes progressive, the patient's mental anxiety is depicted upon his face, it assumes a worn and worried look, not unlike the facies abdominalis in the more severe abdominal lesions.

In connection with the symptomatology of this condition, I wish to specially allude to vomiting following a laparotomy. It has often been a question with me when the vomiting that can be wholly ascribed to a properly administered anesthetic should cease.

Of course, the temperamental state of the patient, the amount of anesthetic used, etc., are factors to be reckoned with.

It can be assumed that vomiting, which has persisted for twenty-four hours after a laparotomy, can be attributed to some other irritating factor than that of the anesthetic, especially so when there is evidence of abdominal distention, and the character of the vomitus has changed from the bilious to a foul-smelling fluid. The nature of such vomiting must be looked upon as one of reflex irritation, a reflex phenomenon of the sympathetic nervous system, causing a regurgitation of intestinal contents to the stomach. Nausea and severe retching may usher in vomiting in paralytic ileus. However, as long as the patient can remain quiet and is not given any fluids, the less will be the vomiting, though the patient may feel sick. It has been my observation that when a patient vomits frequently and with ease, *i.e.*, brings up a mouthful of dark-colored, foul-smelling fluid without any exertion, the condition of that patient is serious, even though no other symptoms of an apparently alarming nature may be present at the time.

The prognosis of an adynamic ileus is the most favorable of all immediate postoperative complications. It is the persistency of the

symptoms with the increased distress of the patient, and the inability to establish a bowel movement at a time when physiological conditions demand the relief of the alimentary tract, that the situation becomes at all alarming. The patient, as a rule, is relieved of his abdominal distention within five days. It may happen, however, that the measures for relief fail and that death may ensue from a toxemia or from exhaustion.

Much can be said relative to the treatment of a paralytic ileus, but still more can be said relative to the prophylactic measures, which, when properly carried out, will do much to mitigate this distressing condition. The careful preparation of a patient for abdominal section is not to be underestimated. Patients with surgical lesions of an acute nature, where operative measures must be immediate, are an exception. With a patient, however, where the lesion is not acute, a preparatory treatment of at least a week is desirable. The preparatory treatment is purely hygienic in nature, with special attention to diet and to the organs of elimination.

It is to the surgeon who performs the abdominal section that we look for the comfort of our patient. If the operator is rough in the handling of the organs, if he exposes the intestines without the proper protection, tears and pulls at adhesions, with a surgical execution of the slam-bang type, then almost anything may be expected during the postoperative period. When the surgeon, however, exercises that delicacy and gentleness of touch in his work that human organs and tissues should be accorded, if he exposes only that portion of the intestinal tract which is necessary, and keeps the exposed coils covered with a gauze pad moistened in warm saline solution, if his dissections are made with precision and with the least amount of mutilation of the tissues, his hemostasis that of a finished surgeon, such a patient is being given every possible chance for a comfortable postoperative convalescence.

It appears to me that a paralytic ileus could to some degree be anticipated, viz., a stomach lavage given before the patient is removed from the operating room. This is especially indicated when the operation has consumed considerable time with the patient in the Trendelenburg position; twenty-four hours after the operation the administration of calomel with a liberal quantity of bicarbonate of soda, and a fraction of pulv. opii, to be followed twelve hours later with a saline draught and a stimulating enema, may establish an active peristalsis with the resultant bowel movement and the expulsion of the pent up flatus. When such a happy condition is once established, the patient's convalescence will not be harassed by gas

pains of any severity. Gas pains of a mild nature, however, may manifest themselves at intervals. If the condition is one which has progressed to an extreme paralytic ileus and the measures just mentioned have failed to produce a bowel movement, or the expulsion of an appreciable amount of gas, it becomes imperative that a systematic régime in the hands of a competent nurse be instituted and continued till results are obtained. The administration of purgatives, although not contraindicated in the full sense of the word, will be of little avail because the patient in most instances will not retain them.

The most encouraging measures at our disposal are embodied in the stomach lavage and in the enema. The former should be used every four to six hours while the patient continues to vomit, whereas, for the latter, it may be said that our greatest hope rests here. Fortunately, disappointments have been few. In my hands, the alum enema, as advised by Hardon, slowly introduced into the rectum every two hours, if necessary, has proven so efficacious that I have given it the preference over all enemata. It must be borne in mind, however, that the alum enema is only given to remove the flatus, and that it may require several days of persistent work to accomplish this. Fortunately, the alum is not irritating to the bowel, so that a large number can be administered provided the nurse exercises gentleness.

While awaiting results from the alum enemata, it is well during the interim to occasionally administer a stimulating enema of soap suds with the addition of turpentine. This enema should be introduced as high into the bowel as possible, and the quantity at least a pint. A stimulating enema should not be repeated too often on account of the severe tenesmus it may cause. An enema of olive oil with an admixture of glycerin, or one of magnesium sulphate solution prove excellent substitutes. Of drug medication hypodermically administered, especially of eserin salicylate, and pituitrin, I cannot say that they have given me sufficient encouragement in the treatment of intestinal paresis to feel at all positive of their efficacy. There have been instances where flatus was expelled in enormous quantities after eserin had been administered. This, however, happened in connection with the alum enema régime, making it difficult to correctly judge the action of the drug.

With the administration of pituitrin, I have had a similar experience, this drug also having been given in connection with the alum enema. My experience with pituitrin has been limited to eight

cases. It may be said, however, that its administration has favorably influenced the vomiting in five of the eight patients.

Two remedies whose therapeutic values must not be underestimated in combating a paralytic ileus are strychnia and codein. Through their judicious administration, the exhausted organism is often given renewed tone and strength, factors highly essential in overcoming so nagging a condition as an abdominal distention following a pelvic operation.

DISCUSSION

DR. HUGO O. PANTZER, Indianapolis.—The importance of the subject presented by Dr. Reder is apparent. I wish not to detract any from the statements and practices narrated by the essayist. Postoperative distention with me is practically ruled out. Faulty use of adhesive straps is the cause of a great number of these cases. A light touch of the abdomen, saying nothing of a painful one, causes the underlying parietal musculature to contract; and this in turn affects the underlying intestines. Adhesive straps put on too tightly, or slantingly so as to pinch the skin, or put away around the abdomen, result in compression and spastic contraction of the intestines immediately underlying such pressure. When morphine is used in an effort to relieve gas pains and distention so created, the distention is increased, paralyzing the intestinal musculature. The interrelation between the offensive adhesive strapping and the gas pains is easily demonstrated. Loosen the offensive straps and the patient will report relief at once. In single instances, gentle massage of that part, or of the entire abdomen, or when necessary turning patient in bed, to the right, and back, and to the left and back, will commonly suffice to shift the gases and give relief. A pint of salt water is given by enema every hour, as I have no doubt many surgeons nowadays are giving. The drop method should not be resorted to in cases tending to intestinal distention. It fails of the desired gentle stimulation of peristalsis. If the douche-bag is placed 5 or 6 inches above the nozzle in the rectum, the force is sufficient to produce a gentle stimulation of the mucosa; enough to wean down gently gases and fecal matter and not enough to unfit the rectum for the retention of the fluids. Whenever the patient complaint of distress the enema is discontinued for the while, and the patient told to evacuate. Where this effort of the patient fails, a low Watkins enema is given. Within fifteen minutes after gases or feces are discharged, the nutritive enema is resumed. If the distention does not yield to these remedies, physostigmin or pituitrin hypodermically is given, followed by low Watkins within fifteen to thirty minutes. For the later stages, podophyllin has served me well. Given in 1/10-grain doses, three times daily, it commonly keeps the bowels nicely open and the secretions stimulated. These procedures methodically carried out from the first, anticipate and obviate distention.

DR. GORDON K. DICKINSON, Jersey City, New Jersey.—All roads lead to London, some quicker than others. That adhesive strapping promotes gas pains I can hardly believe, because I have used adhesive strapping dressings for a number of years and very rarely had gas pains following. The so-called gas pains are generally produced with the traumatism of one's hand and not with the traumatism of the apparatus upon the abdomen. In my cases of instrumental surgery my intern says, "I was not up last night with that patient." In some cases, like inflammatory cases, I may have to use the hand and manipulate, and my patient may have gas pains, and my intern has to get out of bed during the night. For the relief of these pains we give pituitrin and give it promptly and expect relief right away. We may not only have evacuation of the bowels but of urine. If the thing continues, there is one thing that has not been spoken of in any of our societies, and that is the use of the Kemp tube. There is nothing more reliable than water at 120° as it passes into the rectum, keeping up the heat by a hot-water bag held over the tube and running it for at least twenty minutes. You can activate the bowel, the kidney and skin, and consequently promote sleep. Sometimes I turn these patients over on their stomachs as I would a baby and have general compression which gives relief.

DR. FRANK D. GRAY, Jersey City.—I would like to emphasize what Dr. Dickinson has said in regard to the efficiency of the Kemp tube at intervals. I have had practically the same experience he relates. I would like also to suggest another form of enema which has not been mentioned, and which I have found very effective in cases of abdominal distention. It is not original at all with me; it was original with the elder Senn, and that is milk and molasses, a pint each. It is very effective in reducing distention.

I would go a little further in regard to the use of pituitrin and would give it as a prophylactic before we have gas pains. I usually administer it in doses of 1 c.c., two or three times a day, to those patients immediately after operation for two or three days. It is very effective in preventing gas pains.

There is one point I wish to make in regard to the type of ileus in these cases. It is a question if they are always cases of paralytic ileus. We lose sight of the possibility of spastic ileus. I have operated on two cases within the last two years with great distention, with all the symptomatology of intestinal obstruction, expecting to find an organic obstruction. In both cases I found nothing pathologic except spastic contraction of certain areas of the ileum. In one case there was a spastically contracted gut about 18 inches in length, the size of my little finger, and in the other case, instead of it being a continuous spastic contraction, it was a series of several contractions each about 4 or 5 inches long. Both of these patients made uneventful recoveries.

DR. WILLIAM E. DARNALL, Atlantic City, New Jersey.—I have often wondered just how much effect a nervous temperament has to do with abdominal distention. I quite agree with what Dr. Reder has said in his valuable paper and with the other gentlemen who

have spoken; but we surgeons are so in the habit of looking for the tangible things we sometimes forget the other side—the psychological. I do not doubt the experience of every one of you gentlemen has been the same as mine. Oftentimes when we take a phlegmatic ward patient and do an extensive Werder operation or Wertheim or something of that sort, we are surprised at how very little distention the patient gets. The patient is comfortable the next day. On the other hand, if we take the high-strung, nervous society woman, of neurotic type, she is frightened to death, and in a state of terror when she goes to the hospital. The operation may be a very simple one where you have not used any trauma or had to pack off the intestines, but the next day you find her all ballooned up with gas, crying and hysterical. The operation has probably been the simplest kind you could do. Just how much effect the neurotic temperament has in distending that intestine I do not know. It is a thing I have observed quite frequently, and what I have said is only in the nature of a suggestion.

DR. JOHN NORVAL BELL, Detroit, Michigan.—I admit that I have had trouble with dilatation of the stomach and with gas pains after abdominal Cesarean section work, as I think most of you have. I have used pituitrin in three cases and my patients have had a less stormy convalescence since I have used it.

The point brought out by Dr. Gray of using pituitrin as a prophylactic might apply in the average abdominal work, but in Cesarean section we must bear in mind we may kill the baby by using pituitrin too soon. I used pituitrin in one case when I started to operate; the uterus was markedly pallid and white, so there is danger of shutting off the circulation and killing the baby if you use it too soon.

DR. ROBERT T. MORRIS, New York City.—We have to go at this matter in a fundamental way and realize the relationship between tonic ileus and atonic, and place them both upon the basis of splanchnic influence. You have first a toxic overstimulation of the splanchnics, then you have tonic ileus; then exhaustion of muscularis and atonic distention.

In regard to the treatment of the latter condition, I quite agree with Dr. Dickinson and Dr. Gray as to the value of the Kemp tube and massage and posture. They said little of posture, but if we place the patient upon the abdomen, we get distinct mechanical value. Improvement may sometimes be noted in fifteen minutes. The use of Kemp's tube and massage is very important, and at other times the old alum enema that most of us have forgotten is of value. An ounce of alum to the quart of water gives a rapid exudation of secretion from the mucous surface of the bowel very much as alum placed in the mouth causes a rapid action of the parotid glands or the secreting glands in that vicinity. These points I believe are practical as we see them in everyday work.

DR. J. HENRY CARSTENS, Detroit.—I cannot agree with Dr. Pantzer about the strapping. I never sew up the skin, I plaster it together. I do not shove microorganisms under the skin into the wound, but strap it up tight, sewing up the fascia only with catgut.

If I do not put plaster on there I cannot bandage it tight enough because some of our patients will dispose of catgut in three or four days, while in others it will stay in for two or three weeks. I do not have these troubles from distention unless I have sepsis. When I have a case of abdominal distention I know I have sepsis to deal with, and if there is no sepsis I do not get distention. If there is distention, I may find a stitch abscess before I get through with the case.

DR. REDER (closing).—I appreciate very much the interest that has been taken in the subject presented to you. I rather hesitated to bring this matter before the Association for fear I might be considered as looking at these conditions too seriously. As I have previously stated, the loss of two patients from what appeared to be an abdominal distention, the postmortem examination revealing nothing pathologic to which death might be ascribed, prompted me to present this subject. Strapping of the abdomen has been alluded to by Dr. Pantzer. I wish to state that in both instances the operation was a vaginal hysterectomy. No strapping of abdomen, of course, was necessary, there being no abdominal wound. If vomiting does not interfere with the taking of food, such as toast or crackers, this measure should be encouraged as soon after the operation as is consistent, that peristaltic action might be encouraged.

A REPORT OF THE END-RESULTS AFTER OPERATION IN
109 CASES OF DISPLACEMENT OF THE UTERUS,
BLADDER AND RECTUM.*

BY

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THE following report is based upon a review of 109 investigated cases of displacement of the pelvic viscera treated surgically, during the years 1912 and 1913 in my services at the Williamsburgh and Deaconess Hospitals. I have had a personal interview with, and have made a physical examination of, each one of the cases here reported at periods varying from six months to two years after the operation. In the majority of cases more than one examination was made. We have found that it is the prevailing position and relation of the body of the uterus to its cervix, and the prevailing position of the uterus in its relation to the viscera of the pelvis that should guide us in the making of a diagnosis.

Two general methods have been used in the correction of the dis-

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placements of the uterus, bladder and rectum. The correction has been made from above, or by the abdominal route, and from below, or by the vaginal route. By the abdominal route the body of the uterus has been placed in its proper position and relation with the other pelvic viscera and with its cervix by taking up the slack in the round and broad ligaments, or by suspending the posterior surface of the fundus of the uterus to the anterior abdominal wall. The correction by the vaginal route has been made by decreasing the size and weight of the uterus, and by decreasing the caliber of the vaginal canal. In both methods by elevating the uterus we also raise the bladder and rectum. In many of the cases here reported the correction was attempted by combining the two methods.

Replacement of the pelvic viscera by suspension has the following advantages: The operator can without any special training easily effect the desired replacement which in a certain proportion of cases is permanent. Pregnancy follows in a certain proportion of cases and of those a very large proportion have normal labor. The more simple the method of suspension, as in ventrosuspension, the less the trauma; the greater the subsequent mobility of the uterus and the more likely a normal labor.

Among the disadvantages of replacement of the pelvic viscera from above or by the abdominal route are: in a large proportion of cases recurrence of the malposition occurs. Frequently the viscera remaining in their proper position after operation, there is no relief of the subjective symptoms. New subjective symptoms frequently develop after operation, as a result of inflammatory adhesions, the thickening of the capsule of the ovary, or to too acute an anteflexion of the body of the uterus upon the cervix. The question of mortality incident to section of the abdomen must also be considered. In over 300 abdominal sections for the correction of malpositioned pelvic viscera the writer had had one death.

Of the various methods of replacement of the uterus, bladder and rectum by the vaginal route the only one used in the 109 investigated cases reported in this paper is the special operation which the writer has devised and which he reported in detail in an article entitled "Description of a New Method of Repair for Vaginal Hernia with a Report of 140 Cases in which It Was Used," published in the *Medical Record*, Nov. 22, 1913.

The anatomical basis for this operation is as follows: Posterior versions, flexions and prolapses of the movable uterus and prolapses of bladder and rectum we consider as hernia. We have found, with but very few exceptions in these cases, upon making a vaginal

examination, a laceration or relaxation of the levator fascia or muscle in the posterior vaginal wall and of the superficial fascia at the posterior aspect of the vaginal outlet. We have also found, upon making a vaginal examination in these cases, especially in cases of retroflexion and prolapse, a relatively large cervix as compared with the fundal portion of the uterus, the hypertrophied cervix corresponding to the sac in other forms of hernia. The enlargement of the cervix and relaxation of the muscle and fascia in the posterior vaginal wall also generally accompany posterior displacements and prolapses of the movable uterus in women who have never borne children, and in virgins.

In brief, the technic of the operation is as follows: The patient is placed in a lithotomy position. The cervix is thoroughly dilated and the interior of the uterus painted with a 50 per cent. solution, in alcohol, of tr. of iodine. No curetment is made of the uterus. If the cervix be hypertrophied as a result of trauma infection, or glandular congestion, the excessive portion of the cervix is removed, and the vaginal mucous membrane united with the uterine mucous membrane with interrupted sutures of No. 2 chromic catgut. An incision is now made beginning at the lateral mucocutaneous junction of the posterior aspect of the vaginal outlet. The amount of tissue, that without too much tension, may be brought up to the urethra, is estimated, then the mucocutaneous junction at this point is grasped with a mouse-toothed forceps, and with slight traction a curved incision is made with a pair of scissors, the convexity directed toward the anus, extending to a point at the same level on the opposite side of the vaginal outlet. A flap of mucous membrane is now dissected upward and with a clamp held clear of the operative field. This flap is allowed to remain and acts as an umbrella to protect the plastic work done below from the irritating discharges above. By means of the gloved index-fingers the dissection is continued laterally until a firm fascial layer is made out. The layers of fascia and muscle are then brought together with a continuous suture of No. 2 chromic catgut. The superficial fascia is similarly united with the same strand of catgut. The skin is dissected free from the superficial fascia to the extent of one-eighth of an inch. This is particularly important, as without the dissection it will be frequently found impossible to bring the skin edges together. A clamp is now placed at the posterior angle of the skin incision and the wound is securely sealed with from four to seven Michel's clips. The clips are removed at the end of one week. If the clips are new ones and properly placed there should be no trauma from

their pointed ends at the end of seven days, and there should be very little difficulty experienced in removing them.

The vaginal operation for the restoration to position of the pelvic viscera, has the following advantages: The uterus and with it the bladder and rectum are restored to their proper position in the pelvis without interfering with the mobility of the uterus. There is relief of the objective symptoms in a large proportion of cases, especially in cases of procidentia. There is no increase of subjective symptoms referable to the abdomen. The operation does not cause the body of the uterus to become flexed upon the cervix. Old tears of the posterior vaginal wall may be repaired by this method three days after the uterus has emptied itself after a full term of pregnancy or after an abortion. The repair holds during labor in a very large proportion of cases.

The vaginal operation has the following disadvantages: The patient often suffers pain at the posterior aspect of the vaginal outlet for some time after the operation, the pain being increased as the patient sits upon a hard surface. Coitus is sometimes painful after the operation, especially if at the time of operation the denudation be carried up into the large labia. In some cases, especially in virgins, there is inadequate drainage for the uterine and vaginal secretions. In postpartum and postabortal cases there is danger of embolus following trauma to the engorged veins of the posterior vaginal wall.

In many of the cases reported in this series the replacement of the viscera of the pelvis was attempted by combining the two methods already mentioned, suspension from above, and support from below. In these cases it has been somewhat difficult to decide what benefit, if any, the patient derived from the suspension and what from the vaginal repair.

Following is a summary of the end results in the 109 cases investigated.

The body of the uterus was replaced to its proper position in the pelvis by the abdominal route combined with some sort of vaginal repair in sixty-one cases. Of these replacements, twenty-four were made by plication of the round and broad ligaments on the upper and anterior surface of the body of the uterus, according to the method of Coffey, combined with some form of repair of the cervix or of the vagina. The operation has been fairly satisfactory. In twenty-one cases the patient has had a restoration of the pelvic viscera to their proper position, and in twenty of the cases the patients felt an improvement after the operation. Five became pregnant subsequently; one miscarried at the twenty-fourth week of her pregnancy; four went to term and were delivered vaginally of living children.

The uterus was suspended by plication of the round and broad ligaments without the aid of vaginal surgery in three cases. The uterus was movable and in place in two cases, and in two cases the patients felt improved after the operation. One became pregnant subsequently, carried her pregnancy to the twelfth week, and then aborted.

In this series of investigated cases the uterus was suspended from the anterior abdominal wall with No. 2 chromic catgut combined with some form of vaginal repair in thirty-three cases. Where the uterus was not freely movable and posteriorly displaced, or where the round ligaments were poorly developed, this simple method of suspension has been used. The uterus remained in its proper position in twenty-three cases. In twenty of the cases the patients felt some improvement after the operation; nine women became pregnant and eight were delivered of living babies; one died.

The uterus was suspended from the anterior abdominal wall without repair of the vaginal tract in seven cases. One became pregnant; three felt better after the operation, and in five cases the uterus was in place and appeared to be movable.

The Baldy or Webster method of suspension was frequently used. The large amount of trauma to the broad and round ligaments frequently giving rise to varicosities in the broad ligaments and the exposed position of the sutures on the top and back of the uterus often causing postoperative adhesions. Four of these suspensions combined with a repair of the vaginal canal were investigated. Two of the patients on examination showed the uterus movable and well placed, and two felt some improvement after the operation. None of the patients had become pregnant.

The vaginal method of supporting the uterus, and with it the bladder and rectum combined with the suspension from above, has been satisfactory to the patient in forty-two of the sixty-one cases examined. The uterus has remained in position and has been movable in fifty of the cases; fourteen of the patients became pregnant; two aborted; ten had normal deliveries, and two were delivered by the aid of forceps. Thirty-six of the patients had had the uterus supported by repair of the posterior vaginal wall without suspension; twenty-eight of these women felt improved after the operation, and in thirty cases the uterus was movable and in good position. The prolapse of the rectum was relieved in ten of the cases examined. The bladder in fifteen cases, in which it was involved in the procidentia, was placed in its proper position in the pelvis in nine cases. Eight of these women became pregnant after the operation.

The mobility of the uterus has never been interfered with when replacement was effected by support from below, and flexions of the body upon the cervix have not resulted from the operation. One death occurred which was probably due to cardiac embolism.

CONCLUSIONS.

1. Morbidity and not mortality should be considered in all operations for the correction of displacement of the pelvic viscera.

2. The morbidity will be less in replacements by the vaginal route than by the abdominal route.

3. The relative position of the body of the uterus to its cervix should be considered in the relief of symptoms and not the position of the uterus in its relation to the other viscera of the pelvis except in cases of marked procidentia.

4. A movable uterus out of place will give rise to fewer symptoms than a well placed uterus not freely movable, and a movable uterus that has been suspended will give rise to no untoward symptoms during labor.

5. Old tears of the perineum may be repaired three days after labor or after abortion with assurance of success.

DISCUSSION

DR. ALBERT GOLDSPOHN, Chicago.—When this method of restoring the descended uterus by the vagina is pursued, as has been described by the essayist, the uterus will necessarily thereafter rest upon the pelvic floor continually. That is not a physiological condition. The uterus is intended in the absence of exercise of intra-abdominal pressure, as during defecation, etc., not to be in contact with the pelvic floor at all, but suspended by its own ligaments, pelvic fascia, etc.

It is necessary if the operation shall be complete to do more than that. We can shorten the sacrouterine folds if these are chiefly elongated and the cervix descends toward the vulva, then that is the principal indication; otherwise shortening the round ligaments is the only thing that is rational to correct the position of the uterus in its upward and anteroposterior position. While that can be done by the vagina, it is not the most advisable way of doing it, so that we need to do something, if my opinion is correct, from above to achieve the best results.

Coming to these operations from above, I am rather surprised in this day to hear a report about ventrosuspension. I had thought and almost believed that that was on the shelf. The essayist speaks of unsatisfactory results, and that there are too many recurrences of displacements. He has the reason right there. Ventrosuspen-

sion is a thing that I never practised and never believed in at any time. As to ventrofixation, yes in cases that could not conceive, but ventrosuspension never had an indication for me in any person whatever. The round ligaments, I taught for many years back, stand as the unanimous choice of modern gynecologists for that use. Whether they have any use otherwise physiologically in the unoperated woman or not, is altogether irrelevant. It is a pettyfogger that will allude to such an argument. If they have no use we can give them a use innocently and with most permanent good results. Of that I am just now in a position to speak. I have not said anything about my retroversion work for some years, but being requested to get ready to present the results of my work from two to more years back, for the forthcoming International Gynecological Congress next year, by the Secretary of that Congress, I have been working in conjunction with my paper here on resection of ovaries, and I am now not through with this investigation by far. But I have examined enough to know that the right use of the round ligaments is not only thoroughly innocent of all harm, but it does not prevent conception or embarrass labor, and what constitutes the clinching proof, is what I have in years gone by called "the double test for pregnancy," namely, that after labor retroversion does not return. That I can certify to by a series of examinations of about sixty made recently on women upon whom the operation was done seven years ago. There is one single case of return of the retroversion, and that was due to a septic accident that happened in the hospital, and the uterus was out of place when she left; and she was reoperated. Aside from that, there is not one of any of these women who have any return of the retrodisplacement, and those who had children have even a more intensified shortening of the round ligaments. Their uteri are up more ideally than those who have not conceived.

I must give credit to the essayist for one admirable feature. He says, "I have examined all these patients." That is noble. When reports come in of such work to the effect that the patient wrote a letter or tells me so and so, or that she feels tip top, they cannot be considered as reliable evidence. It is simply hearsay evidence. We are before the court of science and we should be exact and truthful, not simply accept subjective reports, but insist on getting objective findings by examination and report the facts, whether good or bad.

DR. ROSS MCPHERSON, New York City.—I have been very much interested in Dr. Wade's paper and I think one of the important things that should be considered in connection with the obstetrical part of this subject is the reason why so many women have retro-deviations after labor. It is not entirely a matter of unrepaired perineums, it is largely a matter of subinvolution and a heavy uterus, and the subinvolution is usually the fault of the obstetrician, who insists on getting the patient up too soon. There is developing a pernicious habit of getting people out of bed too soon and we get in this manner, and for this reason more retrodeviations than we would otherwise see. This is a point which deserves a great deal of consideration in the way of treatment as a matter of prophylaxis.

Regarding the repair of these lacerations, I have done the vaginal operation very much after the manner suggested by Dr. Wade for a considerable period, and it has given me great satisfaction, but I have not felt that the repair of the perineum and vaginal portion of the birth canal is the only thing to consider. It does not seem to me that there are many cases in which the combined operation is not the thing to do. The type of operation, whether you do a ventro-suspension, or the Webster-Baldy, or Coffey, or some other operation depends upon the condition you find. The operation of ventro-suspension should not be entirely relegated to the shelf. There are certain cases where it works nicely, but, on the other hand, we meet conditions where the round ligament operation can be very well done.

There has nothing been said about the old Alexander operation. In cases of movable uteri the Alexander operation gives surprisingly good results. On the other hand, if you are doing an intraabdominal operation and have to deal with poor round ligaments, you have not much left except a light suspension.

A word about suspension. There are so many people who do fixations when they intend to do suspensions. They grasp the uterus with tenacula, make four nice holes, put in number three chromicized catgut, hold the scarified uterus up against the peritoneum, and make a band of adhesions an inch wide which will undoubtedly be an obstruction to future labor. If you treat the uterus gently as it should be treated, using plain catgut sutures and only a fine filmy adhesion, you can hold the uterus up until the congestion is reduced and normal conditions are reestablished; many times this operation can be done with great advantage.

In regard to the repair of old lacerations, three days after labor, I have had practically no experience. I have been afraid of it for the reason that I think involution of the vaginal tissues takes place pretty extensively, and I have never been able to make up my mind how much to repair or how much to let alone until such involution and return to normal has taken place. There is some danger due to excessive congestion of the posterior vaginal wall, which the essayist admits, and I feel that this procedure is not a particularly desirable thing to do. I do feel that the truest thing that can be said about retrodeviation of the uterus after labor is the fact that many women are getting up too early after operation and that these women should remain in bed much longer.

DR. GORDON K. DICKINSON, Jersey City, New Jersey.—Sometimes the general surgeon makes the best gynecologist, and for the replacement of descended or retroflexed uterus nothing has been said about the uterosacrals. Dr. Franklin H. Martin, of Chicago, in an article in the *Journal of the American Medical Association*, published an operation for prolapse and descensus of the uterus which seems to answer the purpose very well. You bring the fundus down into the vagina, you put some guy ropes through the uterosacral ligaments one-third, bring them through the parametrium close to the cervical and body portion of the uterus, and stitch them together anteriorly, then try cystic imbrication and cystic suspension and colorrhaphy,

and so forth, and you have a condition which will hold and not give distress.

DR. EMERY MARVEL, Atlantic City, New Jersey.—I am prompted to say a word in connection with Dr. Wade's fatal case, and to call attention to one of the evils in the procedure of ventrosuspension, and that is this: If the individual upon whom ventrosuspension is performed should be the host of spirochete infection, she is likely to get dangerous adhesions. The ventral suspension aims to secure adhesions, but there is an element in this special form of infection that produces extensive plastic exudate and adhesions when the peritoneum is traumatized. Intestinal obstruction is likely to follow and probably death.

DR. CHANNING W. BARRETT, Chicago.—Dr. Wade's classification of these conditions as hernia is entirely right. The question as to whether these hernias can be cured by an operation from above or an operation from below, or which one is the best, is untenable ground, because neither one of these procedures meets the conditions that should be met to cure the hernia. The operation from below gives the patient, if the operation is done well, a good pelvic floor which she needs to cure these conditions. It does not meet one of the other requirements of throwing the uterus out of line with the vagina, and a retrodisplaced and prolapsed uterus that is left in line with the vagina will return. The hernia will continue. Another condition that must be met is to do away with redundancy of the anterior vaginal wall, so that it will not roll out over the best sort of pelvic floor that can be made. If we undertake to do this work from above only, we meet only a part of the requirement. We may temporarily throw the uterus out of line with the vagina, but where we undertake to make those ligaments that we shorten or create do the work that the pelvic floor should do, in a little time the uterus is down again. Four conditions must be met to cure that sort of hernia. The essayist has spoken of certain operations and none of these operations is new. Whatever operation may be chosen we must make a good pelvic floor, and we cannot do that without dealing with the levator ani muscle. We must get the vagina out of vertical line, we must have it set obliquely to the pelvic floor, and that is partially done by making a good pelvic floor, and partially by throwing the upper end of the vagina backward, which may be done by putting the fundus forward, or we may need to shorten the sacro-uterine ligaments according to the case. Next we must do away with the redundancy of the vagina and get the uterus out of line with the vagina, if the uterus is left. If the uterus is pathologic, it should be taken out, and the ligaments which normally support the uterus, should be attached to the upper end of the vagina. The procedures used were not the approved procedures of the present time. The trained gynecologist does not want to do a ventrosuspension operation, and that should be left out of consideration. The round ligament operations spoken of by the essayist were those that used the poorest part of the ligament to hold the uterus forward, and any sort

of procedure that shows the percentage of evil results or poor results that this report furnishes is its own condemnation.

DR. FRANK D. GRAY, Jersey City, New Jersey.—I am rather gratified that reference has been made to this pathological condition as a hernia. It justifies me, in a way, for my feeble thesis which I presented in joining this Society last year, calling this a "major pelvic hernia." Furthermore, there is one point which I made in that paper which has not been touched on here to-day. I recommended the repair of the posterior wall, and the anterior wall; if necessary amputation of the cervix; and then suspension by the round ligaments, plus advancement of the base of the bladder upon the anterior face of the uterus to cure more or less of a cystocele.

DR. EDWARD A. WEISS, Pittsburg.—I would like to ask Dr. Wade why he laid emphasis on the point that he did not curet in these cases. While we do not believe in indiscriminate curetting, yet the curet has a distinct place in this type of operation. There are many cases of retrodisplacement of the uterus which can be treated with pessary, but the cases which require operation have a certain amount of pathology in the endometrium, and we believe that careful discriminate curetting is indicated in many of these cases. I should like to know his reasons for not curetting.

DR. WADE (closing).—I expected the criticism that I have received in reporting these cases of ventrosuspension. I appreciate that at the present time this operation is out of style. It is a simple operation although a more difficult operation will give you no better results.

I looked up thirty cases where I had suspended the uterus simply by stitches to the anterior abdominal wall with number two chromic catgut, and of these thirty cases, twenty-eight went through labor and had living children through the vaginal tract. Two of them had dead babies. One was a cross breech, and one was a face presentation. The danger in doing the round ligament suspension is that you must more or less traumatize the delicate serous membrane, and consequently you are apt to interfere with the mobility of the uterus, and if you do interfere with the mobility of the uterus, you may have an anatomical cure, but the subjective symptoms will generally be increased. Dr. Goldspohn spoke of the fact that the uterus after the repair rests upon the pelvic floor. In the great majority of cases there is hypertrophy or enlargement of the cervix, and that hypertrophied portion of the cervix is removed; the uterus is lightened thereby, and we are doing the same as we would in another hernia in removing the sac. We have found that retroversions do not cause very active symptoms. It is the retroflexions that give us the symptoms of dysmenorrhea and cause women to be sterile. If the uterus is freely movable, and most of the time retroverted in many cases, you will have no symptoms from the position of the uterus.

Dr. McPherson spoke about the danger of traumatizing the uterus in bringing it up into the abdominal wound. We have found that to be the case. In all our abdominal sections, where replacement

of the pelvic viscera is necessary, no retractors are used in the wound. The uterus is grasped between the index-finger and thumb and brought up into the wound. No clamps are put upon the peritoneum in closing up, no gauze pads or gauze sponges are put in the abdominal wall that we may have a better view of the pelvic viscera. I have looked up the cases and I find we have over fifty cases where we have done repairs of old tears on the vaginal outlet three or four days following delivery or abortion. We have at the Williamsburg Hospital a great many abortion cases and many of these women have old tears which they have carried around with them for two or three years. These tears heal more rapidly, three or four days after the uterus has emptied itself, than any other time. The one danger is keeping away from engorged veins in the posterior vaginal wall.

The remarks of Dr. Marvel may throw some light upon the case that died.

Dr. Barrett spoke of the fact that the levator ani muscle and fascia must be brought together. I think I made that plain in my report. The entire repair consists in bringing the fascia muscle together, and then the skin portion of the incision is sealed secondarily with the clips and the flap we have allowed to remain, and the posterior vaginal wall protects the stitches from infection or from discharges above.

In November, 1913, we had 208 cases which my associate Dr. Walton reported in a paper published at that time in which we had used iodine in the place of curetting. As to the curet, you cannot see the work of the curet, and no man who has done curetting and then hysterectomized two or three of these patients, feels he has done great good with the curet. We do feel, however, that the curet has a place in diagnosis. Where you do repair work no good can come from traumatizing the interior of the uterus. The secretions will be increased in amount and the results much better in our experience by slowly dilating the cervix and swabbing the interior of the uterus with a 50 per cent. tincture of iodine and alcohol.

RENAL DAMAGE FROM CALCULI.*

BY

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THE knowledge of the probable effects that calculi will have upon the kidney, directs our treatment in each case. A calculus that by reason of its character and location is doing no harm, and is not

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likely to cause damage, had best be left alone; and, on the contrary, one that because of its size, shape, position, and the presence of infection, is sure to produce serious renal effects, had best be treated by operation.

There are many factors that determine whether or not a calculus will do damage, and, as a rule, it is a combination of two or more of these that operate to cause the most serious consequences. In general these factors are size, shape, surface contour, number, location, mobility or fixation, and the presence or absence of infection.

From an experience with about forty cases, the details of thirty-two of which are shown in the chart, tables and pictures, I have come to the following conclusions:

1. Lithiasis is essentially a chronic disease. Undoubtedly the calculus in each case was present much longer than the symptoms, yet the average duration of symptoms was four years—the minimum being one month and the longest eighteen years. The development is often insidious, and frequently complete destruction of a kidney occurs with very little discomfort or interference with the general health. In only two cases, running a septic temperature, was the general health much impaired.

2. Multiplicity of stones was found in fifteen cases, though in only two were both sides affected. In calculous anuria, this bilateral involvement should always be considered. The concensus of opinion is that sympathetic anuria is rare, and that in nearly every case it will be found that the unsuspected kidney is congenitally absent or has been previously destroyed by disease. Reflex pain is another condition that is to be looked upon with suspicion—a definite cause for pain is generally to be found, and I regard this so-called reflex pain as very rare (see Case III).

3. Stones, unless multiple or very large, situated in the calices, in the absence of infection, or the opening of a blood-vessel by attrition, cause little discomfort and *little damage*. The size and location in these quiescent cases should be determined by frequent radiographs, and when the stone remains favorably situated and does not enlarge, a waiting policy should be the one used. When very large, pressure atrophy of the renal parenchyma occurs.

4. When a stone enters the pelvis of the kidney, then obstruction is likely to occur, and with the consequent retention, infection will sooner or later develop. The rougher the stone and the greater the retention, the greater the liability of infection, so the more urgent need of operation. Calculi able to be passed through the ureter, enter it soon after they have dropped into the pelvis from one of the

calices. So we seldom see pelvic stones that are subsequently passed. Stones in the pelvis that obstruct have many features in common with ureteral calculi.

5. Ureteral calculi that are small, smooth, do not completely obstruct, move downward constantly and are passed in a relatively short time, do only temporary damage. Those that are fixed, or obstruct seriously the outflow of urine soon lead to irreparable damage, especially if infection takes place. Stones in the pelvis that ball-valve it, and ureteral calculi, as a rule, cause much more suffering and greater renal damage than stones located in the calices, especially when upon the retention, infection supervenes. Ureteral calculi often become embedded in the ureteral wall, and after operation, stricture of the ureter is very apt to occur, and cause further damage of the kidney.

6. The effect of calculi upon the kidney is dependent mostly upon the obstruction that is produced, and is added to by infection, which was present in 68 per cent. of my cases. There were nine cases of pyelitis and pyelonephrosis, five of pyonephrosis, and five of infected hydronephrosis. In seventeen cases the function of the involved kidney as compared with its fellow was determined, and in only two was it normal, in four the loss of function was moderate, in three great, and in eight complete. This analysis shows that in practically 50 per cent. there was damage to the renal function, and that in 25 per cent. it was completely destroyed. These numbers fall short of showing the real condition, for in fifteen cases, nearly 50 per cent. of the total, no determination of function was made.

7. Of the thirty-two cases, the calculi produced no injury in thirteen, in nine there was pyelitis and pyelonephritis, in five pyonephrosis, and five infected hydronephrosis, and I believe it is fair to assume that some of the nine pyelitic and pyelonephritic cases would have in the course of time advanced to the stage of pyonephrosis and infected hydronephrosis; and that of the thirteen undamaged cases, many would later have become more seriously involved.

8. In the pyonephrosis cases and the infected hydronephrosis with great loss of function, nephrectomy is advisable.

9. In the ureteral cases with great loss of function, it is debatable whether the removal of the stone, or the kidney, is advisable. My own opinion is that better results are obtained by removing the kidney than the stone, and that the best results come from removing the kidney and ureter to a point below the stone.

10. As infection is one of the greatest dangers, our examination should be conducted with this in mind. The method upon which I

insist is radiography, first and always. The estimation of the damage done the kidney is best determined by observation, through a cystoscope, of the elimination of indigo-carmin injected intravenously. Seldom is there any need for the use of the ureteral catheter. Occasionally, but not often, it is necessary to insert an x-ray catheter to be certain that a given shadow is in the ureter, or to pass a waxed tip catheter when radiography fails us.

TABLE 1.—DISTRIBUTION OF CALCULI.

Kidneys.....14	Right, 7	{	Calices.....	5
			Pelvis.....	5
			Pelvis and calices.....	1
Left, 5	{	Calices.....	3	
		Pelvis.....	2	
		Both, 2	{	Calices.....	0
Pelvis.....	2			
Ureters.....12	{	Right, 9		
		Left, 3		
Kidney and ureter, 4	{	Right, 3		
		Left, 1		
Kidney and kidney and ureter..... 1	Right kidney and left kidney and ureter.			
Doubtful..... 1				

TABLE 2.—NUMBER AND SIZE OF CALCULI.

Single.....	17
Two or more.....	15
Size:	
Small.....	11
Large.....	8
Medium.....	9
Large and small.....	1
Medium and small.....	1
Not determined.....	2

TABLE 3.—EFFECT ON KIDNEY.

Pyelitis.....	9
Pyonephrosis.....	5
Infected hydronephrosis.....	5
None.....	13

TABLE 4.—DURATION IN YEARS.

Minimum.....	1 month
Maximum.....	18 years
Average.....	4 years

TABLE 5.—PREVIOUSLY PASSED STONES.

Number.....	7
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TABLE 6.—FUNCTION OF INVOLVED KIDNEY.

Before operation.		After operation.	
No loss.....	2	In only three cases was this determined. In two cases there was improvement, and in one the improvement was doubtful. The actual results are probably better.	
Moderate loss.....	4		
Great loss.....	3		
Complete.....	8		
Not determined.....	15		

TABLE 7.—OPERATIONS WITH RESULTS.

		Cured.	Died.	Improved.
Pyelotomy.....	6	4	1	1*
Pyelonephrotomy.....	1	...	...	1
Nephrectomy.....	4	3	1	...
Ureterotomy.....	9	8	1†	...
Ureterotomy and subsequent nephrec- tomy.....	1	1	...	..
Passed stones.....	2	...	...	...
Nothing done.....	9	...	...	...

CASE I.—Referred by Dr. D. W. Cairns, of New York. Seen first on March 4, 1906. In 1898 noticed for the first time that the urine was turbid; this has persisted until the present. In 1903 passed an oblong, hard stone, which was quite rough. Had been suffering much with colicky pain in the right renal region for six years previously. Since the passage of the stone has had pain in that side, but no colics. Both ureters were catheterized, and purulent urine obtained from the right. Lavage of the renal pelvis helped, but did not clear up the pyuria. Radiography showed a calculus in the right kidney. Patient refused operation and was lost sight of. When seen by me, this patient complained of only moderate discomfort and pyuria.

CASE II; FIG. 5.—Referred by Dr. John Van Doren Young of New York. Seen first October 27, 1911. Aged thirty-eight. In October, 1910, had severe pain in the left side of the abdomen just within and below anterior spinous process; this was preceded for twenty-four hours by some soreness in this region. The pain lasted four hours and morphine by hypodermatic injection was necessary for relief. There was no further trouble until October 18, 1911, when there was severe pain for twelve hours; there has been much soreness since. Shortly after the first attack it was noticed that the urine was turbid. It showed a moderate amount of pus. Radiographs showed a branched stone in the left kidney, the projection going upward into one of the calices.

On November 3, 1911, I removed the stone through an incision in the posterior aspect of the pelvis, which was sutured. For forty-eight hours urinary drainage was considerable, very little in the third twenty-four, and after that none. Patient made an uneventful recovery and has had no further trouble.

This patient had a rather large calculus which had evidently been present for some time. The pain was always over the middle portion of the ureter, yet there was no history of the passage of portions of the calculus, nor were any found radiographically.

* Large calculus in either pelvis. Only one side operated. To return for removal of other stone.

† Died of pneumonia on second day after operation.

CHART NO. I.

Figure number	Kidney				Ureter		No. of stones	Size (a)	Duration, years	No. previously passed	Pus	Blood	Loss of function (b)	Pyelitis	Pyonephrosis	Infected hydro-nephrosis	Operations (c)	Result (d)	Improvement of function (e)	Remarks	
	Calices	Pelvis	Calices	Pelvis	Right	Left															
																					Right	Left
1	I	...	...	...	...	...	I	M	6	I	+	+	ND	+	+	+	+	+	+	o	
2	...	I	...	...	...	...	I	L	2	o	+	+	ND	+	+	+	P	C	o		
3	...	...	2	...	...	...	2	L	6	o	+	+	?	+	+	+	P	D	o		Phenolsulphonephthalein normal. Large white kidney. Parenchymatous nephritis.
4	I	...	...	...	...	...	2	S	1/12	I	+	+	ND	+	+	+	U	D	o		Died pneumonia.
5	6	I	...	...	...	...	8	L	10	o	+	+	G	+	+	+	PN	I	o		Nephrectomy would have been better.
6	...	...	...	...	...	...	I	S	4	o	+	+	ND	+	+	+	P	C	o		Small stone ball-valved pelvis.
7	...	I	...	...	...	...	2	L	6	o	+	+	G	+	+	+	P	I	o		Only one side operated. Patient was in bad condition. Improved.
8	I	...	...	...	...	...	I	S	1	o	o	+	ND	o	o	o	o	S	o		Hematuria, slight, short time, only symptom.
9	...	I	...	...	...	...	2	?	18	o	+	o	M	+	+	+	o	S	o		Constant hematuria and backache 18 years.
10	...	...	2	...	...	...	6	S	1 1/2	2	+	+	ND	o	o	o	o	S	o		Was six months pregnant. Escaped observation.
11	...	...	...	...	...	...	1	L	2 1/2	2	+	+	C	+	+	+	o	S	o		Large stone in pelvis. Kidney very large. Function completely destroyed.
12	...	...	4	...	...	...	4	L	10	o	+	+	C	+	+	+	N	C	o		Only symptom pyuria, accidentally discovered.
13	...	...	...	...	...	...	I	S	2	o	+	+	C	+	+	+	N	D	o		Died from uncontrollable hemorrhage.
14	...	...	4	...	...	...	4	L	?	o	+	+	C	+	+	+	N	C	o		Complete loss of function.
15	...	I	...	...	...	...	2	M	2	2	+	+	N	+	+	+	PS	I	o		Passed large ureteral calculus spontaneously.
16	...	...	...	...	...	...	I	M	3	o	+	+	C	+	+	+	N	C	o		Small stone lower calyx. Pus came in ropes from ureter.
17	...	I	...	...	...	...	I	M	4	o	+	+	M	+	+	+	P	C	I		Stone ball-valved pelvis. Operated two years ago for appendicitis—erroneously.
18	...	I	...	...	...	...	2	S	4	o	+	+	M	+	+	+	P	C	I		Both stones removed through pelvis. Improvement in function at end of two weeks.
19	...	...	...	...	...	...	2	S	5	o	+	+	ND	+	+	+	N	C	o		Intermittent attacks, ureteral obstruction—chills—temperature.

CHART NO. I.—(Continued)

Figure number	Kidney				Ureter		No. of stones	Size (a)	Duration, years	No. previously passed	Pus	Loss of function (b)	Pyelitis	Pylonephrosis	Infected hydro-nephrosis	Operations (c)	Result (d)	Improvement of function (e)	Remarks
	Right		Left		Right	Left													
	Calices	Pelvis	Calices	Pelvis	?	?													
20	Loeise	?	?	?	?	2	2	4	4	0	0	N	0	0	0	0	S	0	Passed uric acid calculi both before and after x-ray. Fine radiographs—no shadows.
21	Ronner	28	...	2	...	2	L	6	0	0	0	C	0	0	0	N	C	0	Intermittent attacks ureteral obstruction.
22	Razza	23	...	1	...	1	M	1	0	+	+	M	+	0	0	N	C	1	Diagnosed wrongly as typhoid. Ureter size little finger above stone.
23	Holmer	22	...	...	...	1	M	2	0	+	0	ND	+	0	0	0	S	0	Stone in intravesical portion ureter. Operation refused.
24	Woodward	25	...	1	...	1	M	3	0	+	0	ND	0	0	+	U	C	0	Two ill-advised operations on kidney—stone lower end ureter.
25	Guntcher	20	...	2	...	2	L	4	0	+	+	G	+	0	0	U	1	0	Overlying bladder mucosa fulgurated. Stones came into bladder.
26	Corwith	20	...	1	...	1	S	1	0	+	+	ND	+	0	0	0	S	0	Patient died heart trouble three months after consultation.
27	Blebl	27	...	...	...	1	S	6	0	+	0	C	0	0	0	U	C	0	Ureterotomy. Later nephrectomy. Marked atrophy kidney one-fourth normal size.
28	Marie Loughlin	19	...	1	...	1	S	?	0	+	+	ND	0	0	0	P. S.	C	0	Was seen protruding from ureter. Passed two hours later.
29	Lena Strassman	26	...	...	...	1	S	2	0	+	0	C	+	0	0	U	C	1	Two ureters, right kidney. Stone in ureter to lower pole. Function upper pole normal.
30	Parry	...	...	1	...	1	M	8	0	+	+	ND	+	0	0	U	C	0	Intermittent attacks ureteral obstruction. Kidney large. Function probably greatly damaged.
31	Kellogg	...	...	1	...	1	M	4	0	+	0	ND	+	0	0	U	C	0	Had had previous diagnosis of various intra-abdominal conditions.
32	Rubel	...	...	5	...	10	S	1	3	+	+	ND	+	0	0	0	S	0	As calculi were numerous and small, advised to do nothing.

ND = Not determined
 L = Large; M = Medium; S = Small
 S = Slight; M = Moderate; G = Great; C = Complete; N = No loss
 N = Nephrotomy; PN = Pyelonephromy; P = Pyelotomy; Nec. = Nephrectomy
 U = Ureterotomy; P S = Passed spontaneously
 C = Cured; I = Improved; S = Same; D = Dead
 N = None; O = Not determined; S = Slight; M = Moderate

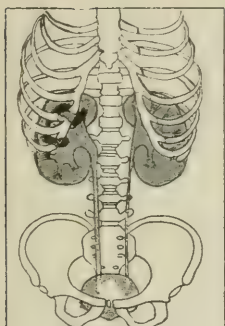


FIG. 1.

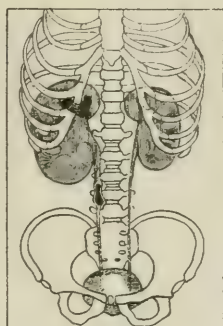


FIG. 2.

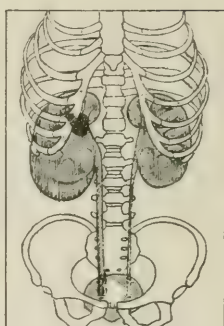


FIG. 3.

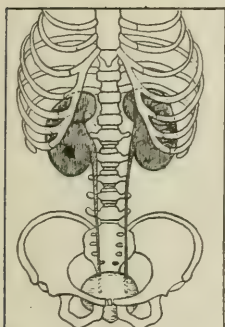


FIG. 4.

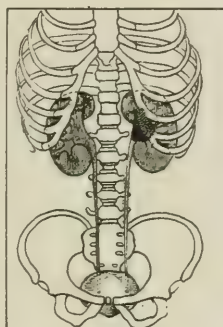


FIG. 5.

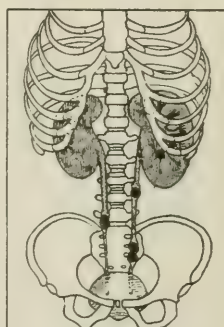


FIG. 6.

FIG. 1.—Case No. 15. Radiograph taken shortly after patient had passed small calculus. At this time kidney only slightly enlarged. The function of each was same.

FIG. 2.—Case No. 15. Two months after Fig. No. 1 was taken lower calculus engaged in ureter and caused severe renal colic. Kidney slightly larger than before.

FIG. 3.—Case No. 15. After two weeks of severe colics Fig. 3 was made. Stone in lower end of ureter and kidney larger. Before passage of stone, which was induced by injecting oil, the ureter could be felt as an elastic tube size of little finger. Stone $\frac{1}{4}$ in. by $\frac{3}{4}$ in.

FIG. 4.—Case No. 8. Stone in lower calyx. Brief hematuria and slight lumbar pain only symptoms. Advised against operation unless symptoms became more marked or stone increased in size.

FIG. 5.—Case No. 2. Large stone in pelvis of kidney. Had only two brief attacks of pain over pelvic brim. Moderate pyuria. Posterior pelvotomy. Cured.

FIG. 6.—Case No. 10. Passed two stones one and a half years before. Moderate hematuria from left kidney only symptom. Refused further examination and treatment and escaped observation.

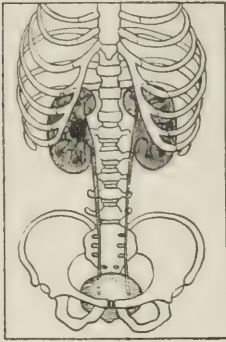


FIG. 7.

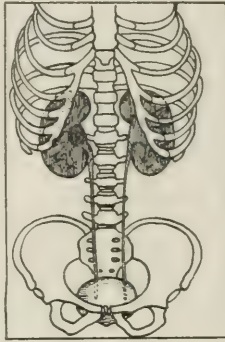


FIG. 8.

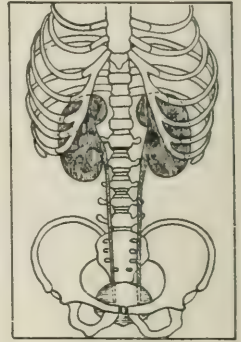


FIG. 9.

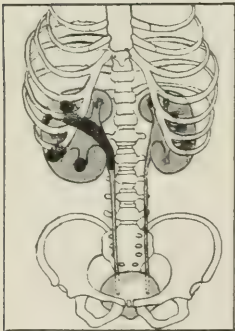


FIG. 10.

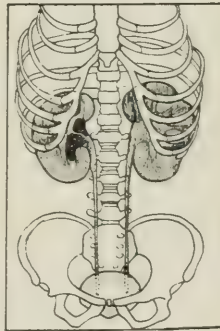


FIG. 11.

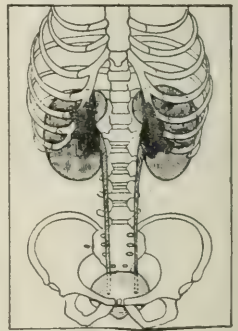


FIG. 12.

FIG. 7.—Case No. 17. Stone ball-valved pelvis and caused much pain. Erroneously operated for appendicitis. Moderate functional damage. Posterior pelvotomy. Cured.

FIG. 8.—Case No. 18. Stone ball-valved pelvis and caused much pain for 4 years. Small stone in lower calyx. Moderate functional damage. Both stones removed through pelvis. Two weeks after operation function had improved.

FIG. 9.—Case No. 6.—Stone ball-valved pelvis and caused much pain. Perinephritis. Posterior pelvotomy. Cured.

FIG. 10.—Case No. 5. Numerous stones in calices, pelvis and ureter. Great functional damage. Pyelo-nephrotomy. Some improvement. Nephrectomy would have been better operation.

FIG. 11.—Case No. 3. Two large stones in renal pelvis. Kidney greatly enlarged; acute parenchymatous nephritis. Phenolphthalein elimination normal. Pyelotomy; died.

FIG. 12.—Case No. 7. Large stones filling both pelvises. Great functional damage. Right removed by posterior pelvotomy. Improved.

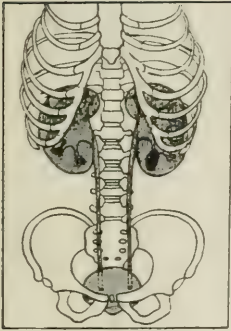


FIG. 13.

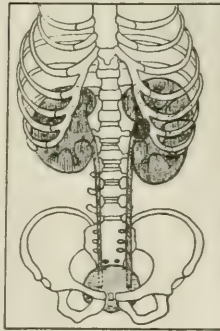


FIG. 14.

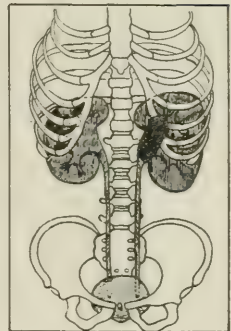


FIG. 15.

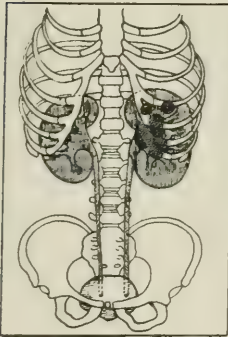


FIG. 16.

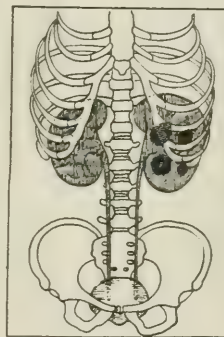


FIG. 17.

FIG. 13.—Case No. 16. Medium size calculus in lower calyx. Pus exuded from ureter in ropes. Complete loss of function. Nephrectomy. Pyonephrosis. Cured.

FIG. 14.—Case No. 13. Small calculus in pelvis. Complete functional loss. Nephrectomy. Kidney was very adherent and capsule edematous and much thickened. Whole kidney filled with miliary abscesses. Died operative hemorrhage.

FIG. 15.—Case No. 11. Large stone filling pelvis. Kidney very large. Complete functional loss. Patient septic. Lost sight of.

FIG. 16.—Case No. 14. Patient had interposition operation for uterine prolapse. When examined for backache and pyuria shortly afterwards, pus was found coming from left kidney. X-ray showed four large stones. These had previously given the patient little if any trouble. Nephrectomy. Pyonephrosis. Cured.

FIG. 17. Case No. 12. Aside from slight backache and pyuria accidentally discovered, no symptoms. Radiograph showed four large stones. Nephrectomy. Pyonephrosis. Cured.

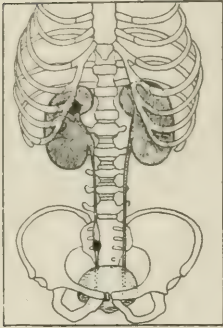


FIG. 18.

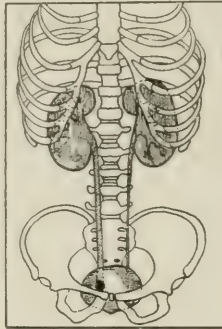


FIG. 19.

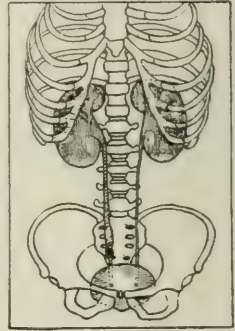


FIG. 20.

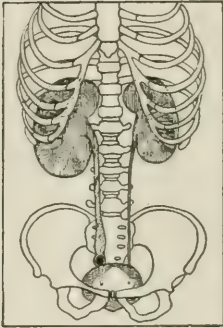


FIG. 21.

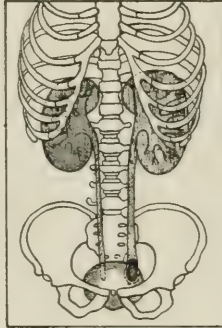


FIG. 22.

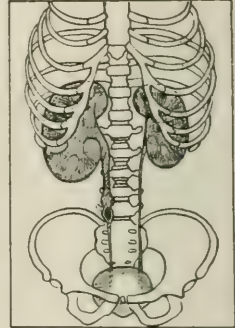


FIG. 23.

FIG. 18.—Case No. 4. Previously passed one stone. Renal colic four weeks. Stone in ureter could not be made to pass by injection of oil, though catheter could be passed beyond it. Function of both kidneys markedly lowered. Separate function not determined. Patient died two days after ureterotomy of pneumonia.

FIG. 19.—Case No. 28. Old woman came complaining of frequent and painful urination of two weeks duration. Cystoscopy showed marked edema of ureteral orifice, from which there protruded a calculus. This was loosened with a catheter and passed two hours later.

FIG. 20.—Case No. 26. Patient probably had calculus for a year, and that it entered ureter four weeks before seen. Function both sides same. On account of age advised waiting policy. Patient died of heart trouble three months later without having another attack of colic.

FIG. 21.—Case No. 31. Pain over lower right abdomen for years, diagnosed as various conditions. Attempts to make calculus pass by injection of oil unsuccessful. Function not determined. Ureterotomy. Cured.

FIG. 22.—Case No. 23. Renal colic at times for two years. Frequency six months. Stone in *juxta-vesical* portion of ureter. Function not determined. Attempts to dislodge by dilatation of ureter unsuccessful. Refused operation.

FIG. 23.—Case No. 22. Stone at pelvic brim. Trouble started in fourth month of pregnancy and was diagnosed as typhoid. Ureterotomy. Ureter size little finger above stone. Cured.

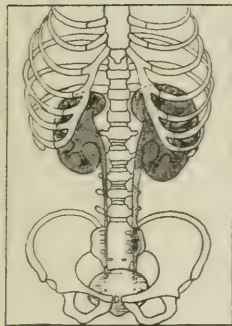


FIG. 24.

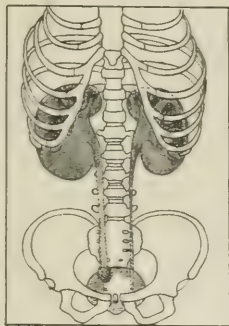


FIG. 25.

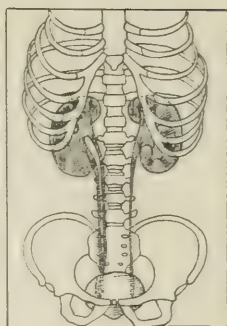


FIG. 26.

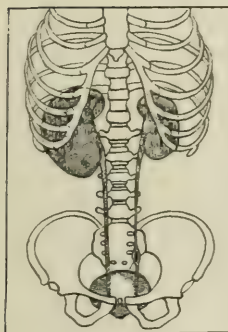


FIG. 27.

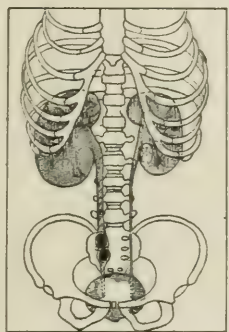


FIG. 28.

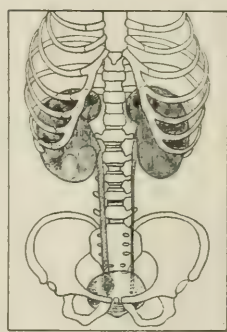


FIG. 29.

FIG. 24.—Case No. 19. For five years attacks of renal pain with chills and temperature. Pus from left ureter. Function not determined. Ureterotomy Cured.

FIG. 25.—Case No. 24. Had two ill advised operations on kidney—mistaken diagnosis. Function not determined. After removal of stone from lower ureter by ureterotomy patient was cured.

FIG. 26.—Case No. 29. Two ureters right side with calculus in one to lower pole. No elimination indigo-carmin from this ureter; occurred in 2 1/2 minutes from other right and the left ureter. Ureterotomy. Cured.

FIG. 27.—Case No. 27. Probable duration six years. Three years ago renal hematuria decapsulation. Three months afterward urinary fistula developed and drained two months. Came on account renal pain. Complete absence function. Radiograph showed calculus lower end ureter. Ureterotomy. Failure to relieve—nephrectomy of atrophied kidney—1/4 normal size. Cured.

FIG. 28.—Case No. 21. Intermittent attacks of renal colic, with nausea, vomiting, chills and temperature for six years. Complete absence of function. Ureterotomy. Cured.

FIG. 29.—Case No. 25. Several years ago attacks renal pain. Seen on account backache and hematuria. Fulgurated what was thought a broad base papilloma. Later two large stones came through fulgurated area into bladder. Refused to have these removed, or further examination.

CASE III; FIG. 11.—Referred by Dr. Guion, of New Rochelle. This patient had some pain in the left renal region for a short time after the birth of her only child in 1895. Since 1907 she had had attacks of pain in the left renal region, associated with temperature, nausea and vomiting. These have come on several times a year, the last one starting April 23, and persisting for five days. During this time she had frequency of urination, and noticed some blood and pus in the urine. In February, 1912, she passed some gravel.

When seen by me she was having pain in the left renal region and had a temperature of 101° . Examination of the bladder urine showed a large amount of blood and many pus cells. Cystoscopy revealed a mild cystitis. Through ureteral catheters urine was obtained. That from the left showed a small amount of pus and 0.6 per cent. albumin, no elimination of phenolsulphonephthalein after one hour's observation. That from the right showed a small amount of pus, much blood, and 0.2 per cent. albumin, and 28 per cent. phenolsulphonephthalein in one hour.

Radiographs showed two large stones in the pelvis of the right kidney (Fig. 11). Because of the symptoms referable to the left side and the low phenolsulphonephthalein output another catheterization of the left ureter to the renal pelvis was done and 10 ounces of urine collected in a steady flow.

The stones in the right kidney were removed by posterior pelvotomy and the pelvis was not sutured. There was drainage for seventy-two hours, during which time 12 ounces of bladder urine in twenty-four hours was collected. After the cessation of the drainage 80 to 90 ounces were obtained from the bladder in each twenty-four hours.

CASE III; FIG. 11.—For the first three days after operation there was excessive thirst and vomiting. On the fourth day she became irrational, more so on the fifth, and died on the sixth from renal insufficiency.

Here is a case where the presence of shadows of stone in the right kidney with a history of left pain might lead one to suppose that the pain was of reflex origin. Had it not been for the low output of phenolsulphonephthalein that made me make another examination, I might have overlooked the 10-ounce hydronephrosis. In this case my plan of treatment was to put the right kidney in good condition and afterward to remove the left.

In this case the large output of phenolphthalein from the right kidney was misleading. At operation the right kidney was found to be fully twice normal size and very white. It is in such cases as this, parenchymatous nephritis, that the elimination of phenolsulphonephthalein is larger than the function of the kidney would lead one to believe.

CASE IV; FIG. 18.—Referred by Dr. P. S. Boynton, of New York. Seen first February 6, 1913. Aged fifty-seven years.

In 1898 passed four stones per urethra which, from the history, evidently had their origin in the left kidney.

On January 8, 1913, while reading was seized with sudden pain in the left renal region, radiating downward along the ureter, which required a hypodermic injection of morphine for relief. That same afternoon there was another attack. On January 11, another more severe attack, associated with chills and rise of temperature, necessitated patient being in hospital five days. Since then the temperature has ranged from 100 to 101°. Another such attack on January 29. Radiographs show shadows of two stones in the lower pole of the right kidney and one in the lower end of the right ureter. In passing a catheter into the right ureter an obstruction was met at 1½ inches and another at 4 inches, the upper one being the most difficult to pass. Oil was injected above the stone at this time, and on February 8, glycerine, but neither dislodged the calculus.

On February 11, Dr. Boynton removed the stone transperitoneally, after milking it to a point opposite the promontory of the sacrum. This stone was the size of a pea, and shaped like an arrowhead. Patient died forty-eight hours after operation from pneumonia.

Remarks.—The long freedom from the trouble after the passage of stones in 1898, the sudden occurrence of trouble anew with two calculi in the kidney and one in the ureter, are the noteworthy features of this case. The renal calculi were not operated upon as they were not causing symptoms, and the condition of the patient was bad.

CASE V; FIG. 10.—Referred by Dr. Guion, of New Rochelle. Seen first in January, 1913. Since 1900 has had some frequency of urination and gets up three or four times at night to pass urine. In November, 1912, after lifting a heavy chair, she had sudden acute pain of a few minutes duration in the right renal region. That night there was a chill and rise of temperature, the temperature lasting a few days. In December she had temperature for several days, but with no pain. Patient never noticed turbidity of the urine until she had an attack of quinsy in January, 1912, when her physician discovered much pus. Except for a slight trigonitis, the examination of the bladder is negative. The urine from the left kidney is clear; that from the right contains a large amount of pus from which colon bacilli were isolated in pure culture. The ureteral catheter is obstructed at 9 inches. Radiographs show two large calculi, end to end, the lower extending down into the ureter and the upper into the upper calices of the kidney. There are shadows of several smaller stones scattered through the calices (Fig. 10).

Indigo-carmin injected intramuscularly appears strong from the left kidney in twelve minutes, the interval between spurts being thirty seconds and the ejection lasting five seconds. On the right it appeared in the same time, but only faintly; on this side the spurts were without vigor, but lasted fifty seconds with ten seconds interval.

On January 17, 1913, I cut down on the right kidney, which was slightly prolapsed, and only slightly enlarged. The adhesions

were not marked. As the kidney appeared to contain a large amount of normal tissue, I removed the two large stones through the posterior incision in the pelvis, and several of the smaller ones by incisions in the cortex. The pelvis was not sutured. Urinary leakage for only seventy-two hours.

The patient made a good recovery, but within two months after operation passed three stones, and continued to have her pyuria. Since the operation she has had some pain in the right renal region, and as the pyuria persisted and the functional capacity of that side has not improved, I advised nephrectomy. She went to someone else with less radical views, and I lost sight of her.

Surely these calculi have persisted for a long time and yet there was only one attack of pain. The pyuria, which was also probably of long duration, was not noticed until it was found in a routine examination by her physician.

CASE VI; FIG. 9.—Referred by Dr. K. K. McAlpine of New York. Seen first on April 11, 1911. For several years this patient had been suffering from pain in the left renal region, which was relieved by the recumbent posture, to return when up and about. The urine contained a small amount of pus and blood. Radiographs showed the shadow of a small round calculus, which at operation proved to be in the renal pelvis. This was removed by incision in the pelvis posteriorly. The pelvis was closed by fine catgut suture and there was no leakage afterward. There has been no trouble since the operation. This small stone, situated as it was and ball-valving the ureter when the patient was erect, caused a great deal of distress.

CASE VII; FIG. 12.—Nurse. Seen first February 1, 1913; thirty-seven years old. Had been in good health until the beginning of the present trouble which started in 1907. At that time she was taken with severe pain in the left renal region and inability to void urine. Had temperature and was sick for two weeks. In 1908 she had a similar attack, but this time the pain was in the right renal region. After this the attacks came on, at first, every six months, then every three, and later every six weeks, alternating from one side to the other. In these she had vomiting; the pain was much relieved after vomiting; there was also dysuria, but never suppression as in the first attack. In 1910 she was taken very ill; pain, temperature, and bloody and pussy urine. Since then all the attacks have been on the right side. Began to lose weight in 1910, and for the last four or five months has been losing strength.

Examination shows a small, thin, anemic woman. Catheterized bladder urine shows a large amount of pus and some blood. Cystoscopy shows a cystitis granularis. Catheterization of the right ureter done. No drainage from it; a large amount of pus is seen coming down the ureter alongside of it. Urine from the left side shows a moderate amount of pus, and some red blood cells; 0.6 phenol-sulfonephthalein injected intravenously did not appear in the bladder until nineteen minutes had passed.

Radiographs.—In each kidney, and forming a cast of the pelvis, is seen a shadow of a large branched calculus (Fig. 12).

On February 14, 1913, under gas-oxygen anesthesia, the right kidney was exposed through an oblique incision, brought into the wound and the large calculus removed through the pelvis posteriorly. The pelvis was almost one-fourth of an inch in thickness. Catgut closure of the fascia and muscles; silkworm-gut closure of skin. A cigarette drain down to the pelvis. It was my intention to have this drain remain for sixty hours, but in the dressing it was by mistake taken out. There was urinary drainage for seventy-two hours, then cessation. On the tenth day there was some escape of pus and a small amount of urine from the middle of the wound. This persisted for two days, and after that the wound was dry. The patient made a stormy convalescence; there was much nausea and vomiting for six days, and extreme weakness. However, the patient pulled around and was able to go home on the thirty-eighth day after operation. The stone in the left kidney will be left until the patient has regained enough strength to warrant its removal. Much damage to the kidney function had been done by the long presence of these calculi, and this was well indicated by the marked delay in the beginning of the elimination of the phenolsulfonephthalein. Except for urgent indications, I would not operate upon cases showing such a low elimination. Had I used ether, or had I attempted to do both sides at once, I feel sure that I would have lost my patient.

September 7, 1913. On account of the illness and death of her mother this summer, the patient has put off operation on the other kidney. She has improved much since the operation and has been free from the attacks of pain that she experienced on the left side.

CASE VIII; FIG. 4.—Referred by Dr. Guion of New Rochelle. Patient thirty-four years old, seen first on December 6, 1912. Has had four children, the last born August, 1912. Since the birth of this child she has had some backache and difficulty in walking. In the middle of November, 1912, she noticed that her urine was a port-wine color for eight days from admixture of blood. This cleared and was noticed again on December 3, though not so much as before. When seen by me there was no blood in the urine and cystoscopy failed to show any vesical cause for hemorrhage and the ureters appeared normal.

In October, 1912, she had severe pain in abdomen and back for eighteen hours, but no more on one side than the other. Radiograms of the urinary tract show a medium-sized stone in one of the lower calices of the left kidney. Unless the pain in October was due to the calculus, this patient had only her hematuria to call attention to the presence of the trouble.

I advised that the stone be determined radiographically, and that, unless there was an increase, more hematuria or other troublesome symptoms, she be not operated.

CASE X; FIG. 6.—Seen first on June 1, 1910. Patient aged twenty-six; mother of two children, the youngest stillborn April, 1909. Felt well until November, 1908; when, at the fourth month of her last pregnancy, she had severe pains in the left lumbar and left inguinal regions, lasting eighteen hours. There was some

temperature the following week. Three weeks after the birth of the last child she passed a small oval calculus and another three weeks after this, the only pain being in the urethra as the stone was being expelled from the bladder.

Since April, 1909, she has had some pain in both inguinal and the left lumbar regions. From the first of April, 1910, she has noticed some blood in the urine, and it is for that reason that she came to consult me.

Cystoscopic examination of the bladder is negative. The right ureteral catheter is obstructed at nine inches, and the left at three inches. Clear urine from the right, and urine containing a moderate amount of blood from the left. Radiographs show two stones in the calices of the left kidney; stone in the left ureter opposite the transverse process of the third lumbar vertebra, two stones in contact in the pelvic portion of the left ureter; and a stone opposite the transverse process of the third lumbar vertebra in the right ureter (Fig. 6).

While this patient had had one attack of renal colic and had passed two stones, her chief complaint was the hematuria, which, in all probability, was due to the renal calculi in the left kidney. She became pregnant shortly after the examination and was lost sight of. The multiplicity of the stones is a noteworthy feature in this case.

CASE XI; FIG. 15.—From the service of Drs. Quintard and Chace of the Post-Graduate Hospital. Seen first January 16, 1913. Has had four children. During her second pregnancy in 1910, she had much pain in the left renal region. While she noticed no blood, the laboratory report showed its presence and that of a small amount of pus. This pain kept up during the pregnancy and shortly after the delivery she passed two stones from the bladder. After this she felt better until the beginning of 1913, since which time she had had constant pain in the left renal region, pyuria, and hematuria, and has lost much weight and strength. Since the middle of December, 1912, has been having chills and running a high temperature. Von Pirquet positive. January 21, 1913. Patient thin, weak and shows the effects of septic condition. Bladder holds without discomfort 200 c.c. boric acid solution. General catarrhal cystitis. No urine seen coming from the left kidney. Indigo-carmin injected intramuscularly appears on the right side weakly in nine minutes and strongly in twelve. None eliminated from the left. January 20, phenolsulfonephthalein in two hours 82 per cent.

February 12, 1913. While in the hospital temperature ranged from 99.5° to 101° . Radiographs show the shadow of a calculus the size of a pigeon's egg in the pelvis of the left kidney (Fig. 15). The patient went to the country to gain strength before operation and was lost sight of. In this instance the calculus had caused infection and destruction of the kidney and a nephrectomy would have been indicated.

CASE XII; FIG. 17.—Referred by Dr. Edward Quintard, of New York. This patient was first seen in June, 1909, on account of pyuria. She was forty years old, a widow, who had never had any children. In 1900 her maid told her that the urine in her chamber

was turbid and suggested that it be examined. It was found to contain a large amount of pus. She had no frequency of urination. She had for a short time only mild pain in the lumbar region, no more marked on one side than the other. Was treated for years with bladder irrigations without benefit. Radiographs showed four large stones in the region of the left kidney. At operation it was found that the kidney was the size of a grape fruit, with very little renal tissue left. Nephrectomy.

This patient had four enormous stones in the left kidney that had practically destroyed it, and the only symptom of which she had complained was pyuria, and this did not bother her other than by the knowledge of its presence.

CASE XIII; FIG. 14.—Seen first in July, 1913; thirty years old. She was an Italian from whom we were able to obtain very little history. For three months she had been suffering with pain in the left renal region and had been having chills and temperature. For this length of time the urine had been turbid from the presence of pus. Examination showed a thin, anemic, much run-down woman, who had a tumor mass in the region of the left kidney the size of a grape fruit.

Cystoscopy showed a mild general cystitis. Both ureters were catheterized and clear urine obtained from the right, while urine containing a large amount of pus came from the left. Ten cubic centimeters of a 0.3 per cent. indigo-carmin solution was injected intravenously. Strong elimination began on the right in three and a half minutes, while on the left there was none in half an hour. Radiographs showed a stone in the pelvis of the kidney.

In July, through an oblique lumbar incision, I cut down on the left kidney, which was densely adherent, and with difficulty removed it. A large vein in the pedicle was torn, and there was profuse hemorrhage, which was not controlled until the patient was practically moribund. She died within a few minutes after being put to bed.

On section the kidney was found to consist of hypernephromatous tumors scattered all over it, extending from the cortex inward. These were found to be filled with miliary abscesses. In the pelvis of the kidney was found an oblong stone half an inch by one-quarter. The hypernephroma and the stone are probably only coincident. The destruction of the renal function was due more to the pyelonephritis than the tumor.

CASE XIV; FIG. 16.—L. D., thirty-nine years old, married, five children. After the birth of first child she had chills and fever for three months, beginning on the third day. The nature and location of infection was not obtainable from the history. For three and a half years patient has had pain in the left lower part of the abdomen which radiates to the back and down the leg; the pain coming on three or four times a day and lasting ten minutes. In October, 1913, she had an interposition operation for prolapse. This patient was first seen by me in April, 1914, at which time she was complaining of pain in the left lumbar region and marked pyuria. Examination of the bladder after an

injection of indigo-carmin showed normal elimination from the right side and none from the left. Pussy urine was obtained from the left ureter by catheterization. Radiographs showed several shadows in the region of the right kidney. On May 10, Dr. Samuel Lloyd removed the left kidney, which upon section proved to be a large hydronephrotic kidney with several stones in the calices, and one in the pelvis.

Patient made an uninterrupted recovery.

CASE XV; FIGS. 1, 2, 3.—Mrs. B. Seen first on June 15, 1914. For ten years has had frequent and burning urination. In 1912 passed two small calculi; had some pain in the bladder at the time, but there was none in the kidney regions at the time of passage or before. In 1912 for a brief time suffered from terminal hematuria. In 1913 began to have periodic attacks of pain in the right lumbar region, these attacks being more severe at the time of menstruation. In April, 1914, had a severe attack of right renal pain, radiating down the ureter, this followed by the passage of a small calculus. Radiographs made at this time showed two stones in the upper calices of the right kidney, with a very small shadow in the region of the lower end of the ureter. Since then has been having dull aching pain in the right kidney region, radiating downward along ureter. The urine shows many pus cells, cystoscopy cystitis granularis. The elimination of indigo-carmine from the left ureter took place in five minutes and fifteen seconds, and was strong; from the right in six minutes and fifteen seconds and was fainter than on left.

June 17 the patient was again radiographed and one stone in the kidney and a large long one in the ureter at the level of the transverse process of the third lumbar vertebra were found.

On July 1 patient began to have severe renal colic that lasted four days. From then on she had several acute attacks of colic. On July 11 the stone could be felt through the vagina in the lower end of the ureter. A ureteral catheter was inserted and met an obstruction one inch up. This was overcome and 3 drams of machine oil was injected. After the removal of the catheter the stone was not to be felt through the vagina. On July 13 and 14 the patient had particularly severe pains, with much bladder discomfort. On the afternoon of the 14th the stone could be felt very low in the vagina and the ureter as a distended tube back of it, the size of the little finger. On the morning of the 15th, the patient was relieved of her kidney pain and in a short time passed the calculus, which was of the shape of a date pit, but one-third larger. The stone was oil soaked, and the urine that was passed at the time and subsequently contained much oil.

The three radiographs show in addition to the stone an enlargement of the kidney at first slight, but at the time of the ureteral obstruction quite marked. The patient has at times some discomfort in the kidney region. She will have the renal calculi removed this fall. The functional damage at the time of my first examination, which was before the stone obstructed the ureter, showed only moderate loss of function.

CASE XVI; FIG. 13.—E. D. Aged sixty-seven. It has been difficult to obtain much history from this patient. For seven years she has had pain in the region of the left kidney of a dull aching character, and frequent urination for the same length of time. In 1911 she had hematuria for a short time. She came to the clinic in July, 1914, complaining of frequent urination. Cystoscopy showed a moderate grade of cystitis. The left ureter showed some redness around it, but this was not marked. After a short period of observation pus in the form of a rope was seen coming from the left ureter; this did not coil up in the bladder as there was little adhesive material in it, and the rope broke up upon the least disturbance of the fluid in the bladder. There was no elimination of indigo-carmin from this side, though on the other it occurred in six minutes. Radiographs showed the presence of a shadow in the region of the left kidney.

On Sept. 2, 1914, through an oblique incision the left kidney was removed. It was most densely adherent. Upon section it was found that the kidney had been converted into a hard, tough, fatty mass, and that there was only a small portion of kidney substance at the lower pole remaining. In the lower pole is found the stone that was responsible for this destruction. Patient is making a good recovery.

CASE XVII; FIG. 7.—L.L. Referred by Dr. G. G. Nicosia. Seen first on May 30, 1914. For four years there was a slight flocculent deposit in the urine. In 1910 had appendectomy on account of pain located over McBurney's point and in the right lumbar region, but this gave her no relief, and this same pain has continued until the present. It is made worse by exertion. In December, 1913, and January and March, 1914, the urine was bloody for a period of two days. Since May 22 there has been marked frequency of urination.

Examination.—Urine shows many red blood cells and a few pus cells. Cystoscopy; acute cystitis with marked edema around the right ureteric orifice. Indigo-carmin injected intravenously was eliminated from the left kidney in six minutes and from the right in nine, but the color on the right was faint. Radiograph shows a medium sized round calculus in the pelvis of the right kidney. On June 8 this was removed through an incision in the posterior wall of the pelvis. Patient made an uninterrupted recovery and has been relieved of all symptoms.

Sept. 11, 1914. Examination to-day shows normal bladder. Indigo-carmin injected intravenously is eliminated from the left ureter in five and a half minutes and from the right in six and a half. This shows a marked improvement in renal function after operation.

CASE XVIII; FIG. 8.—August 8, 1914. L. K. aged twenty-seven. She has had three children, the youngest two years old. For the past two years she has had pain in the right lumbar region, which comes on intermittently, and frequently has been so severe as to necessitate morphia by hypodermic injection. For the past six weeks this pain has been particularly severe, and for four weeks the patient has been in bed. Patient gets

up from one to four times at night to pass her urine. For six years she has had marked digestive disturbances, which consist of nausea and vomiting, and pain one or two hours after eating. In this time she has lost 40 pounds in weight. Radiographs show a shadow in the region of the pelvis of the right kidney, and a smaller one, 1 inch outside of it. The kidney was exposed and pelvis opened, and the larger stone removed from it. With a Blake gall stone forceps the small stone was removed from one of the calices of the kidney through the pelvis. September 10, 1914, patient made an uninterrupted recovery, and has been entirely free of symptoms.

CASE XIX; FIG. 24.—Seen first May 13, 1910. Forty-nine years old. Menopause at forty-two. Her first labor was in 1888, and was instrumental. For six months she was very sick with puerperal fever and phlebitis of both legs, and not well for fifteen months. From 1888 to 1891 she suffered with frequent attacks of pain in the right renal region, and high temperature. The last one terminated in the passage into the bladder of a large amount of pus. There was no trouble until 1907, when she began to have similar attacks in the left side, lasting four to five days. In the past year she has had several. Has had moderate pyuria since 1900. Catheters easily passed into both ureters. That from the left kidney drains purulent urine; and that from the right clear. Radiographs showed two shadows in the pelvis that were diagnosed as ureteral calculi after a confirmatory plate with an x-ray catheter (Fig. 24).

On January 16, 1911, in Quebec, by the combined intra- and extraperitoneal operation, with an incision along the outer border of the rectus, I removed two small stones from the ureter, which were situated 2 inches from the vesical orifice. Cigarette drain for forty-eight hours, after which there was no leakage. The ureter was not sutured. This patient was seen April 12, 1912, and reported that she was well and had no further trouble. The stones were only $1/8$ inch in diameter, a size that would ordinarily easily pass through the ureter. These were very adherent to the ureter, yet the ureteral catheter was passed with no sensation of obstruction.

CASE XX.—Referred by Dr. James T. Padgett of New York. Was first seen September 25, 1911. Aged fifty-seven. Four children; youngest nineteen. Menopause at fifty-one.

In July, 1902, patient had severe pain in the right lumbar region which radiated down the back of leg, and to the bladder. There was almost incessant urination. The attack lasted two days, the spasms of pain being of seven hours duration with intermissions of three. She passed quantities of gravel that looked like granulated sugar. She had pain along this ureter from then until 1905. In 1905 she had a similar attack, lasting five days, which was terminated by the passage of a small calculus; this attack was on the left side. In 1907, after pain in both kidney regions for two months, she passed a small calculus after six hours of severe pain.

In March, 1911, she had blood in the urine for a short time. Was then radiographed, but no evidence of stone was found.

In March, 1911, she began to have pain over the left dorsal region,

which after a time appeared over the sternum and later over the breasts. These attacks would last from ten to twelve hours, and at first were three weeks apart. Recently the interval has been a week.

On September 26, Dr. Leopold Jaches radiographed her with negative results. I then injected both renal pelves with 50 per cent. argyrol and obtained good radiographs showing normal pelves and ureters. The elimination of indigo-carmin occurred from both kidneys within seven minutes after intramuscular injection. The urine was negative. She was free from pain until October 22, 1911, when she had a mild attack. On December 21, 1911, after suffering from Thanksgiving, she passed a small calculus from the left side. She was comfortable until July 4, 1912, when she had pain in the left renal region and after five hours passed about twenty grains of gravel. There was soreness in the left renal region at the time of the report, June 25, 1912.

September, 1913. Since June, 1912, the patient has at times had attacks of pain in the left renal region and has passed two calculi. The history of the passage of calculi, both before and after radiographs, and the normal pelves, as shown by the pyelographs, led to two conclusions; that the x-ray failed to show stones that were present, or that the kidneys and ureters were free of stones at the time of making the pictures, and that they subsequently formed.

CASE XXI; FIG. 28.—Seen first in November, 1909. Fifty-six years old; nine children, last born in 1899. Was in good health until 1904, when she began to have attacks that presented the following symptoms: Lassitude for a few hours, lameness in the right leg, soon followed by slowly developing pain in the right lumbar region, which soon radiated to the front and down the ureter to the bladder. When the pain was at its worst there was vomiting. An attack lasted, as a rule, about twelve hours. During an attack there was frequent desire to urinate; the urine then passed was clear, while that following was turbid and had a heavy sediment. She has these every two or three months, the last one being in April, 1909.

Cystoscopy negative. Ureteral catheter easily passed on the left; the urine from this kidney was clear. On the right the catheter was obstructed at three and one-half inches, and through it no urine was obtained. Indigo-carmin injected intramuscularly was eliminated in nine minutes from the left kidney, while none was observed from the right. Radiographs showed two large stones in the pelvic portion of the right ureter (Fig. 28).

On January 13, 1913, through an incision along the outer border of the right rectus, I removed these two stones extraperitoneally. Each stone is three-fourth inch long by one-fourth of an inch broad. The wound in the ureter was closed with fine catgut, and the abdominal wound drained for twenty-four hours. There was no leakage and healing was prompt.

For six years this patient suffered from attacks due to these stones, and in this time the renal function was destroyed. Early diagnosis and treatment would have saved her a good kidney.

CASE XXII; FIG. 23.—Referred by Dr. Scaturro, of New York. Aged twenty, when seen November 10, 1912. Married in January, 1912, and had a child in October of the same year. From the time she was five months pregnant she had pain over the appendix region, and had chills and fever which led to the diagnosis of typhoid fever. The urine contained much pus. The patient is anemic and shows the result of her illness. The catheterized bladder urine contains much pus. Cystoscopy of the bladder negative. Clear urine from the left kidney. The right ureteral catheter was obstructed at five inches; purulent urine from the right. Radiographs of the urinary tract showed a shadow at the point of obstruction on the right. The patient felt better after the examination, which was probably due to the fact that I loosened up an impacted stone.

On December 8, I removed the stone transperitoneally. The ureter above the stone was dilated to the size of the adult forefinger and was much thickened. The incision was made through the peritoneum, which was adherent to the underlying ureter, and the stone removed. An ounce of urine escaped and shot up into the air about an inch and a half, although the pelvis of the patient was elevated. The wound in the ureter was closed with fine catgut and the peritoneum sutured over it. The stone was T-shaped, and one fourth of an inch long, with the transverse portion of the T something nearly one fourth inch broad. Patient made an uninterrupted recovery and, at the present time, September, 1913, is well and free from symptoms.

Sept. 7, 1914. Examination shows moderate cystitis colli. Indigo-carmin injected intravenously was eliminated from the left kidney in six minutes, but none was observed to come from the right. Ureteral catheter obstructed on right at five inches, but could be forced up to eight inches. No retention shown at this distance; small amount of pus in right urine. The patient has a stricture of ureter and kidney function is badly damaged.

CASE XXIII; FIG. 22.—Referred by Dr. Edward Quintard of New York. Seen first in June, 1910, when she was fifty-seven years old. Has had three children, the oldest born in 1877, and the youngest in 1897. Labors normal. Menopause uneventful at the age of forty-eight.

Previous history negative. In June, 1909, the patient for the first time had colicky pain in the left renal region, which did not radiate, and lasted twelve hours. There was nausea and vomiting during the attack. At this time there was no frequency of urination, but a month later she began to be so troubled, and this has persisted until the present. Since the first attack there have been three others, but none so severe as the first. The urine is normal except for the presence of a few pus and red blood cells.

By vaginal examination, just to the left and behind the cervix, is felt a small, hard oblong mass. The bladder appears normal. On the left side the ureteral catheter meets an obstruction at three to four inches which can be passed. A waxed catheter was then passed and all the wax scraped off. Radiographs show a shadow at the point the ureteral catheter was obstructed.

Attempts were made to have the stone pass by dilating the ureter to 20 French, but were not successful. There was marked inflammatory reaction in the ureter after this instrumentation, and this explains the failure. She refused operation and was lost sight of.

In this case the pain was renal and the only thing to indicate the low position of the stone was the frequent urination. Although the stone was in the terminal portion of the ureter, the appearance of the ureteric orifice was perfectly normal.

CASE XXIV; FIG. 25.—Seen first in January, 1913. The history of this case is rather indefinite as I have been unable to ascertain all the facts. Three months before I saw her, she had had her right kidney explored, and it was said that then she had an infected hydronephrosis due to ureteral obstruction. From time to time, previous to operation, she had been having marked pain in that kidney and running a temperature. Until the drainage wound healed she did well, but upon its closure she began anew to have her old symptoms. A month and a half before I saw her she was operated upon for the same condition by another surgeon, who obtained the same results. The three weeks before my visit she had been running a high temperature and having a great deal of pain in the right side.

The left ureter was easily catheterized. On the right side the catheter met an obstruction at 1 inch. This obstruction was movable, and at the end of my examination I was able to get the catheter in without resistance for two and one-half inches, but no further. By the vagina I felt a hard mass in the ureter region, about the size of a pea, that I felt sure was a stone. I suggested radiographs, and the shadow of a stone was found. The surgeon who did the second operation removed this stone extraperitoneally, and the patient made a good recovery and has been relieved. With our present-day methods of diagnosis, I think it inexcusable for a surgeon to explore a kidney without making use of them. This case is one in point.

CASE XXV; FIG. 29.—Referred by Dr. E. W. Peterson. Seen first July 10, 1912. Forty-nine years old. In 1901 patient had a three-day attack of pain in the right renal region, followed by the passage of a stone and hematuria. She was free from pain and any bladder disturbance until April, 1912, when she had pain for an hour in the right lumbar region. Since then she had had almost constant macroscopical hematuria, and urgent and frequent urination.

The catheterized bladder urine is turbid and reddish from the admixture of blood and pus. Cystoscopy shows what appeared to be a broad base papilloma over the region of the right ureter, with surrounding edema. This could also be felt through the vagina. Thinking it a papilloma, I fulgurated it on July 14, and again on July 18. At the examination on the 21st., I was surprised to see a dark stone projecting through the tumor-like mass. An attempt was made to liberate this through a Kelly tube with the aid of a small curet. This was unsuccessful as the patient was very fat, and would not retain a proper posture and repose. On July 25, another examination showed the stone almost born. It appeared to be of the size of a hazelnut. I planned to have her come to the hospital

with the idea of (under ether) introducing a large Kelly cystoscope and seizing the stone with a wire snare and thus removing it, and if it were too large, to crush it with a lithotrite and wash out the fragments. We had had radiographs made, which were unsatisfactory, so this accounted for the error in diagnosis.

After this I did not see the patient until January, 1913, when upon examination I found two stones the size of a hazelnut in the bladder. The ureteral opening on the right was the size of a lead pencil and was not inflamed or edematous. She had had much pain for three months in the right side, so I suspect the presence of other calculi in the right kidney or ureter.

This was a very instructive case and shows that all cases of supposed papilloma, where the growth is situated over a ureteric orifice, and there is edema, should be radiographed for stone. Fulguration is a slow, but bloodless, and only slightly painful method of liberating these impacted calculi in the lower end of the ureter.

CASE XXVI; FIG. 20.—Mrs. W. F. C. First seen Nov. 13, 1913, aged fifty-three. Three years ago patient was troubled with very painful urination and hematuria which lasted two days. For many years patient has had frequency of urination. In January, 1913, she had pain in the right lumbar region and painful urination, which lasted one day; on August 13, 1913, there was a similar attack. Since the first of September, 1913, she has had some pain in the right lumbar region, which on November 11, was very severe. At that time she had urgent desire to urinate, nausea and vomiting. The next day blood was discovered in the urine, this lasting for a day. Radiographs made to-day show a shadow suspicious of stone in the pelvic portion of the right ureter. Indigo-carmin injected intravenously is eliminated in four minutes on both sides. Microscopical examination of the centrifuged urine show many hyaline and finely granular casts, but no blood nor pus. She was advised that unless she had further trouble, to do nothing for this condition. (Several months later patient died of apoplexy without any recurrence of kidney pain.)

CASE XXVII; FIG. 27.—E. B. In 1908 patient was much troubled with frequent urination, which was thought to be due to cystitis colli, as local applications to the trigonum relieved as long as they were continued. In 1909, on account of pain in the region of the left kidney, she had a nephropexy, but this failed to give her relief. From October 1 to Nov. 15, 1911, she had port-wine hematuria, which the cystoscope showed was coming from both kidneys. Radiographs taken in November were negative for stone. On November 11, she had a decapsulation of the left kidney. After three weeks the hemorrhage ceased. In April, 1912, the kidney wound opened and discharged urine for two months. Since then patient has had much pain in the region of the left kidney and says that at times there is some swelling. Claims that urine at times is very cloudy.

April 29, 1914. Cystoscopy. Marked redness around left ureter, right normal. Indigo-carmin injected intravenously came from

the right ureter in three and a half minutes, but none was observed coming from the left. (In the next two months this was repeated four times with the same results.) Radiograph showed an arrow-shaped calculus in the lower end of the left ureter.

June 3, 1914, the calculus was removed by extraperitoneal operation. As she was not relieved of her symptoms and as the ureteral catheter could not be made to enter the ureter more than an inch and a half the left kidney was removed. It was most densely adherent, and was only one-fourth the natural size. The surgeon who did the decapsulation told me that at that time it was normal in size.

Pathologist's Report.—Gross examination: The specimen consists of a small atrophic kidney, measuring $6\frac{1}{2} \times 3\frac{1}{2} \times 1\frac{3}{4}$ cm.; capsule stripped, reveals a coarsely irregular surface; color, opaque, yellowish gray; consistency, fairly firm. Shallow old nephrotomy wound on convex border near lower pole. On splitting, pelvis is found to be moderately dilated; mucosa congested, rough and thickened. Two or three dilatations from pelvis into kidney tissue toward cortex. Anatomical marking practically obliterated. Ureter appears a trifle thickened.

Microscopic examination shows marked degenerative changes with sclerosis and atrophy of many glomeruli, abundant round-cell infiltration in the interstitial tissue, collapse and shrinkage of most of the tubules, thickening of the blood-vessels, and desquamation of the pelvic epithelium. There is a diffuse development of connective tissue as well as marked perivascular fibrosis. A few tubules are slightly dilated and show the remains of an acute process, containing polynuclear leucocytes and necrotic cell detritus. Many of the small atrophied tubules contain deeply staining hyaline material.

Diagnosis (O. L. Hillman).—Chronic pyelonephritis with atrophy of the kidney.

Undoubtedly the stone in this case existed at the time the radiographs were made in 1911, but as I have not seen the plates I do not know the cause of the failure to detect it then.

In the presence of an infected kidney that had completely lost its function, the operation that should have been done in the first place was a nephrectomy, with excision of the ureter to a point below the calculus. The removal of the kidney without the ureter would have been better than the simple removal of the calculus.

CASE XXVIII; FIG. 19.—Mrs. M. L., aged fifty-five. Patient came into the clinic and stated that her only complaint was marked frequency of urination of three weeks' duration. Upon cystoscopy a swollen right ureter with a small stone projecting from it was seen. The stone could be pushed back into the ureter with a catheter and with each spurt of urine would descend to its original position.

Radiographs showed a shadow in the region of the lower end of the ureter. Two hours after the examination the patient claimed that she heard a small object drop into the chamber when she voided urine. An examination made a week after the first one failed to show the presence of the calculus, and the edema around the ureter had almost entirely disappeared.

CASE XXIX; FIG. 26.—L. S. Age forty-four. This patient was seen first August 15 through the courtesy of Dr. Robert Abrahams. Several years ago she had an appendectomy for ruptured appendix. A ventral hernia exists at the site of the incision. For a year patient has had some dull aching pain in the region of the right kidney that she thought had some relationship to the hernia. On August 9 she had severe pain in the right renal region, radiating down the inner side of the thigh. This was acute for three days, and since then has persisted as a dull ache, more severe than that of which she had formerly complained.

Radiograph showed the presence of a shadow opposite the transverse process of the third lumbar vertebra. Cystoscope showed two ureters on the right side. Indigo-carmin injected intravenously appeared from the left and the right proximal ureter in two and a half minutes, but none came from the distal right in fifteen minutes.

On August 28 the hernia was repaired, and through an oblique incision the stone was removed from the ureter, which was immediately sutured with fine catgut. Drainage for forty-eight hours. Un-eventful recovery. The two ureters appeared to be in a common sheath.

On September 9, the patient was again examined after the injection of indigo-carmin. It appeared coming from the left and the right proximal in three minutes, but it was six before any came from the right distal. This indicates an improvement in function since the operation.

CASE XXX.—Miss E. P., aged forty-five. For a number of years patient has been having attacks of pain in the region of the right kidney, radiating along the course of the ureter. These are usually associated with nausea and vomiting, and in some of the attacks she has had temperature for many days with continuous pain in the kidney region. On palpation the right kidney is found to be one-third larger than normal. Radiographs show a shadow in the region of the left ureter. This stone was removed by Dr. Willy Myer, and since then patient has been free of symptoms.

CASE XXXI.—December 11, 1913. Mrs. G. K., thirty-eight years old. In 1908, just after the termination of her last pregnancy, she had pain in the region of the right kidney associated with chills and temperature, radiating downward along the ureter. Since then patient has had many attacks of pain, sometimes with nausea and vomiting, but without chills. Since July, 1913, these attacks have come on much more frequently and within the past three weeks she has had three attacks. Radiographs show a small arrow-head calculus in the lower end of the right ureter. The ureteral catheter could be passed beyond this stone. The stone could be dislodged, but efforts to make it pass by injections of glycerin were without effect. Two months after the patient was first seen, Dr. I. S. Haynes removed the calculi by the extraperitoneal route, and she has since been relieved.

CASE XXXII.—Seen first, September 3, 1913. Four children, youngest five months old. Has had marked lateral spinal curvature

since she was seven years old. When the last baby was three days old she began to have severe pain in the left renal region, with severe headache. This persisted for ten days. Since the middle of this past July she has had pain in the left renal region, which has radiated down the ureter. She came to my clinic the last part of August when I was away, and then it was seen that the left ureter was pointing and markedly edematous. At this time ureteral catheterization was impossible, as the catheter met an obstruction a short distance up the ureter and buckled back. Radiographs then made showed shadows in the pelvis and in the renal region. When I saw her, which was shortly after a particularly severe attack of colic, when she passed several small stones, the ureter was still edematous, but not so much as when she first came to the clinic. Since then the pain has been better and the ureteral orifice on September 13 appeared only slightly reddened. Radiographs made on September 11 show shadows in the ureter just above the sacroiliac joint and several shadows in the kidney. All of these are small, and it is probable that they will pass with little difficulty. If they do not, I shall through a ureteral catheter inject the ureter with glycerin or olive oil, and in this way encourage their expulsion.

375 WEST END AVENUE.

DISCUSSION.

DR. CHARLES L. BONIFIELD, Cincinnati.—I would like to make one or two remarks in connection with this paper. In the first place, the value of the *x*-ray is undoubted in this day and age. We would not think of trying to diagnose these cases without it.

I remember very distinctly one case I operated on a couple of years ago which had been to one of my colleagues two or three years previously. He had explored the kidney with a needle, and the conclusion was reached: there was no calculus. When she came under my care, *x*-ray examination showed a calculus, and its location pretty accurately. So it was easily removed. It is very important to *x*-ray all these cases early.

The point I want to make particularly is this: I believe we should be very careful about removing any kidney in which there is any appreciable amount of healthy tissue. Professor Fisher of the University of Cincinnati has shown that animals live perfectly well with one-quarter of one kidney, provided that one-quarter is healthy. If we operate upon one kidney we do not know that the other kidney, although healthy and functioning properly at the time, may not become diseased in the next year or two, and if we can save even one-quarter or one-eighth of the kidney that functionates properly, we give the patient a better chance to survive in case the other kidney does become involved. I had this impressed upon me a few months ago. A patient came to me with pyonephrosis; her left kidney was operated upon a year ago, a stone removed, and the ureters catheterized at that time, and as far as I could find out her right

kidney at that time was perfectly healthy. When she came under my care the right kidney was as large as a good adult's head, distended with pus, and there was about one-quarter of the kidney that apparently would functionate, and so I drained that, and was surprised to see before the patient left the hospital how well that kidney was functioning, so that in view of these facts it is important that if we have any kidney tissue left at all that is healthy, to try to save it.

DR. MILES F. PORTER, Fort Wayne, Indiana.—I would like to ask Dr. Furniss what, if any, observations he has made in connection with the incidence of cancer and stones carried in the kidney, and what the result of his observation has been.

DR. FRANCIS REDER, St. Louis, Missouri.—No surgeon to-day would invade a kidney without having a positive *x*-ray picture. I cut down upon a kidney following an *x*-ray picture that to all appearances located a stone in the lower pole. As it happened the stone was about an inch and one-half in the ureter. The kidney undoubtedly must have been displaced as the shadow showed in a manner which gave the impression that the stone was located in the lower pole.

Again, I would emphasize the importance of an *x*-ray being taken shortly before operation. In one of my cases the *x*-ray was taken three days before operation was undertaken, the stone being disclosed in the pelvis of the kidney by the Röntgen ray. When the operation was undertaken no stone was found. The stone was passed in the meantime. An *x*-ray was again taken three days after the operation and no stone was revealed.

DR. LEWIS F. SMEAD, Toledo, Ohio.—I would like to ask Dr. Furniss what experience he has had with calculous anuria, where the stone is small enough to pass, if one could wait, and whether he has been forced to operate for small calculi on account of the calculous anuria alone.

DR. HUGO O. PANTZER, Indianapolis.—The extensive experience of Dr. Furniss would lead me to ask for information. I wish to ask of him, what stress we may place upon irritability of the bladder as a symptom in these cases. Another question is, what objection the doctor has to nephrotomy, what has been his experience with nephrotomy?

My limited experience would lead me to favor nephrotomy in many cases, allowing free drainage afterward.

DR. E. GUSTAV ZINKE, Cincinnati, Ohio.—Recently I had an experience with kidney stones which may be of interest to you. A man, aged fifty-four, complained of no symptom in particular except that he did not void as much urine as usual; and that, occasionally, he would have a dull pain in his back. Examination of the urine revealed a slight trace of pus and a few red blood cells. The *x*-ray showed a very large stone, about the size of a rooster's head, upon the right side, and a stone, the size of a cherry seed, upon the other side. The latter gave rise to no symptoms whatever. The kidney with the large stone was easily found, exposed, incised the full length

and the stone removed without difficulty. There was apparently no evidence of destruction of kidney structure, except a greatly dilated pelvis; this and the presence of a stone within the other kidney, prompted me not to remove the kidney. I therefore sewed it up and fixed it in the usual way. The man did well for one week; he then suddenly began to fail. There was no evidence of peritonitis or sepsis. He simply died of exhaustion at the end of the second week.

I relate these cases with a view to eliciting, if possible, some expression of opinion as to what the members might do under similar circumstances. Here was a kidney which, notwithstanding the presence of a large stone, did not show sufficient destruction to warrant its removal. The operation was not difficult. The case was very promising for one week, and then unexpectedly, and without apparent good reason, the man went into decline, and died of exhaustion at the end of two weeks.

DR. BONIFIELD.—Did you drain that kidney or not?

DR. ZINKE.—Yes, I drained it.

DR. BONIFIELD.—What killed him?

DR. ZINKE.—I do not know.

DR. JOHN F. ERDMANN, New York City.—In regard to associated diseases and with reference to the history cited, five weeks ago I had a patient who presented all the evidences of a badly diseased kidney on one side, with marked evidences of a tumor on the opposite side. An analysis of the urine showed blood, pus, and all the things we find in pyonephrosis, and some of the elements we might find in cases of malignancy. The radiograph showed a large stone on the right side, and an enlarged shadow on the left side. I felt that the large tumor was a malignancy, and the question of hypernephroma arose. I was bothered about the calculous side, from which the pus was coming. He had considerable temperature, with all the evidences of sepsis, and with that staring me in the face I concluded that I would remove the malignant side, and reserve the other infected side for a later stage. I removed from the left side a large and beautiful hypernephroma, the size of a good adult head leaving the other kidney alone. The patient has made an absolutely perfect recovery, but still with profound infected urine. It is my intention in the absence of metastases to attack the calculous kidney later.

DR. JULIUS H. JACOBSON, Toledo, Ohio.—I want to report a rather remarkable case of renal calculi. The patient was a man, thirty-five years of age, who in early infancy had a circumcision performed and the head of the glans penis was accidentally amputated. Stenosis of the urethra followed which he has carried throughout life.

When he came to consult me about one year ago, he had a great amount of pyuria, was suffering very much from renal colic, as a result of this stenosis of the urethra. The *x*-ray showed an immense calculus the size of a billiard ball situated in a diverticulum of the bladder which could be palpated through the rectum. There was also a large calculus in the lower end of the left ureter.

I removed the large stone and diverticulum from the bladder, and at the same time made an attempt to remove the stone from the lower end of the ureter. The ureter stone disappeared as soon as it was touched. The ureter above the stone was dilated to about the size of the small intestine and I could not find the stone again. I opened the abdominal cavity, made a careful search, and could not find it. At a subsequent operation I tried to remove it again, but as I touched the stone, it immediately disappeared. I searched for an hour again but was obliged to give it up. When the patient assumed the upright position, the stone came down, as was shown by the *x*-ray. At the third operation, I temporarily ligated the enormously dilated ureter, removed the stone, and cured the patient.

I also wish to call the association's attention to some important work which has come from Hamburg recently in reference to the diagnosis of those rarer forms of ureteral calculi which do not show on the *x*-ray plate. With the aid of collargol in such cases Professor Kummel and his assistants were able to get a distinct shadow where the collargol solution united with the stone. The method clears up a certain number of kidney stone cases which are otherwise obscure. I regard this as an important addition to our diagnostic methods of renal calculi.

DR. MILES F. PORTER, Fort Wayne, Indiana.—A very simple maneuver would obviate the difficulty that Dr. Jacobson speaks of in losing the stone, namely, clamping the ureter above and below the stone before he makes manipulation, and then it cannot get away.

DR. FURNISS (closing).—Dr. Bonifield spoke of leaving the kidney when there was any kidney tissue left, even if the other kidney is all right. As rheumatism, myocarditis and nephritis are often due to a focus of infection in the body, we should when possible get rid of that focus entirely.

As to the incidence of cancer in connection with these stones, I have seen one case, and that was at the Mayo Clinics.

Fortunately, I have not had any cases of anuria, but there is one point in connection with calculous anuria that I desire to call attention to, and that is, should the operator go ahead and operate on the side giving the last symptoms? That may have been all right before the days of the *x*-ray, but no man should now operate without a radiograph. In calculous anuria death does not occur for several days. Of course, where we have anuria we cannot determine the relative function of the kidneys because neither one is excreting. If we have only one chance to do one operation and no opportunity to have radiographs, it is better to do an operation on the side where the symptoms were last, for the reason that the other kidney may be destroyed.

With reference to irritability of the bladder, that depends upon secondary infection from the kidney. When the stone is in the lowest portion of the ureter we get irritability of the bladder. Fenwick has stated that in a number of cases he has been able to determine by the appearance of the ureter that the stone was in the ureter. In only two of my cases has the appearance of the ureteric orifice been changed.

In regard to nephrotomy, I have not had any stones that I have not been able to get out through the pelvis. In one I took the stones out by a combined pyelotomy and nephrotomy.

It was thought for a long time pyelotomy wounds never healed. Failure of a pyelotomy wound to heal, means obstruction below. The largest single stone I had was taken out through the pelvis; the pelvis was not sutured, and the wound was closed in one week, good and tight.

Dr. Erdmann speaks of a case of calculosis on one side, with a tumor on the other, the patient running a very high temperature. Naturally the question would come up, was this temperature due to infection or not? There is one thing brought out by the Mayos, namely, that in a number of cases of hypernephroma there was temperature associated with the hypernephroma itself. That is a point which is apt to be misleading.

MYOMECTOMY WITH EXTENSIVE RESECTION OF THE UTERUS IN FIBROID TUMORS.*

BY

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CONCEDING the good results recently obtained in many cases of uterine fibroids by the Röntgen ray treatment and its applicability in a certain proportion of such neoplasms of the uterus in expert hands, it is scarcely to be expected that it is destined to supercede their operative removal to any large extent. Further experience and more careful study, especially of the secondary effects of this treatment, will have to be made before its therapeutic standing can be fully determined, and in time we will learn which cases can be safely trusted to the x-ray treatment and which should preferably be dealt with surgically. There are, even at the present time, many reasons which can be advanced in favor of operative treatment as against the Röntgen rays, but there is in this connection particularly one which should appeal to all unbiased minds interested in the treatment of uterine myomata. I refer to the necessity of conservation of the functions of the pelvic organs, especially in young women.

While the Röntgen treatment depends essentially for its therapeutic effect in fibroid tumors on the atrophic changes it produces in the pelvic organs, and consequently the destruction of their functions, the surgeon's aim is, or should be, the saving of the functions

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of ovulation and menstruation, and, whenever possible, that of reproduction in women remote from the climacteric age. The conservation of these functions I consider of the utmost importance for the physical well-being of woman during her active sexual life. This fact is so well understood and recognized by all experienced gynecologists, and so generally admitted on all sides, that arguments are unnecessary and superfluous on my part to defend this position. Even such an enthusiastic advocate of the x -ray treatment as Prof. *Kroönig* of Freiburg says in this connection: "In cases of young women whose menstruation must be preserved, we prefer operation and enucleation, when possible, to Röntgen treatment." (The Difference Between the Old and the Newer Treatment by x -ray and Radium in Gynecological Diagnosis. *Surgery, Gynecology and Obstetrics*, vol. xviii, No. 5, p. 529, May, 1914.) He admits, therefore, frankly that, at least in young women, the Röntgen treatment is contraindicated because of its destructive effect on the functions above mentioned which are so vital to the happiness and enjoyment of health of the patient, that some effort should be made to preserve them, which can be done only by proper surgical treatment. Myomectomy, therefore, is and will always be, the ideal treatment of uterine fibroids, at least in younger women. When this is not practical and the uterus has to be sacrificed, even the preservation of the ovaries is of great value and will prevent entirely, or at least to a very large degree, the symptoms so annoying and distressing in many patients.

Hysterectomy, in the writer's experience, is, however, less frequently necessary, and during the past few years has been performed in comparatively few young women. Myomectomy is possible in a large proportion of cases, not only in the presence of solitary fibroids, but even when a considerable number of these tumors are imbedded in the uterine body. If the growths are large enough to be recognized, are accessible and do not encroach too much upon the uterine cavity, they can usually be enucleated with ease, one after another, and their beds completely closed by layers of catgut sutures, beginning at the bottom of the uterine wounds and drawing the bleeding surfaces together by tiers of sutures until the serous coat of the uterus is reached. A special sero-serous suture inverting the edges of the wound surfaces covers up all raw surfaces, completely controls all oozing and completes the operation, leaving a useful and perfectly functioning, though sometimes rather crippled, uterus. Even large submucous fibroids which, when enucleated, freely open up the uterine cavity and even detach and remove considerable portions

of endometrium, are no contraindication to a conservative myomectomy. The ragged mucosa is trimmed up, the detached pieces cut away, and the remaining mucous membrane closed by a continuous submucous catgut stitch in such a manner that it will not penetrate through the mucosa into the uterine cavity. The remainder of the uterine wound is then closed in the manner described above. The writer has, in a number of such cases where considerable uterine mucosa had to be sacrificed, seen pregnancy follow; one of these cases has recently been delivered of her fourth child. Previous to the operation she had been sterile.

When the larger part of the body of the uterus contains a great number of fibroids, especially smaller sized nodules, complete enucleation of all neoplasms may become impossible, and hysterectomy in such cases is the usual procedure, because small fibroids which may be overlooked during the operation of myomectomy may within a few years give rise to a return of the symptoms. The writer has within recent years succeeded in saving at least the function of menstruation in most of the cases by doing a more radical myomectomy or a "resection of the uterus," which he considers a better term for the procedure. Instead of trying the tedious and generally impossible task of enucleating all the little neoplasms, he excises the tumor-bearing myometrium and large portions of the endometrium, especially when submucous tumors predominate, leaving, however, sufficient uterine wall and mucous cavity to enable the remaining organ to carry on the menstrual function. Many of these cases are usually sterilized by the necessity of resecting the uterine cornua, thus interrupting the tubal communication to the uterine cavity. A wedge-shaped incision is made antero-posteriorly through the uterus or, if the cornua are the seat of multiple small fibroids, it is carried below the cornua on either side into the uterine cavity, removing the upper portion of the uterine body containing the neoplasms. The incised walls of the retained uterus, as well as the uterine cavity, are then carefully searched for any fibroid nodules still remaining. If much tumor-bearing tissue is in the remaining myometrium, still further resection may be done to insure the complete removal of all neoplasms. The endometrium is then trimmed up and the cavity closed by continuous catgut sutures in the same manner as described in myomectomy. The uterine walls are then evened up and any irregularities smoothed off, so that the wound surfaces can be perfectly coapted. They are then brought together by a number of tiers of catgut sutures beginning at the endometrium which previously has been closed, until the serous coat is reached; a

careful sero-serous suture covers up all the raw surfaces and completely checks all oozing. In this manner a uterus, fairly normal in appearance and useful at least as a menstruating organ, is left.

The first resection of the uterus performed by the writer was in December, 1908, and since then, in all, thirteen cases have been operated upon. All of these cases have made a good recovery, demonstrating that the uterus is able to withstand a great amount of mutilation. In this list no cases of ordinary myomectomy are included, not even those in which the uterine cavity was opened and more or less endometrium was resected. In all of these thirteen cases, from one-half to two-thirds of the uterus and endometrium has been removed. Six of them were under thirty years of age and seven over thirty, seven of them were single, and six of them married; only one had children, two others had abortions. All of these have recently been interviewed either personally or by letter, especially in regard to the menstrual function. No pregnancies occurred in any of them; two of them had not menstruated since the operation, one menstruates irregularly and with considerable pain, one is fairly regular with slight pain; three of them are regular, but have slight pain; six are perfectly regular and are entirely free from pain. In all cases menstruation is rather scanty. Only four of these cases were sterilized through the resection of the cornua; in the others the tubal attachments were not disturbed, so that the possibility of pregnancy is not excluded. In some of them ovarian and tubal complications were present requiring resection of the ovaries and removal of the tubes.

While fewer hysterectomies have been done during these recent years in younger women than formerly, it will not be possible to avoid this operation in all cases. In very large fibroids, especially when undergoing cystic degeneration we resorted to supravaginal amputation of the uterus, because a resection proved impossible in several cases in which it was attempted, also in cases in which the cervix was more or less involved or when a large submucous fibroid extended into the cervical canal, the entire body of the uterus was removed. The most favorable cases are those with small or only moderately large neoplasms. Early operation for fibroids in young women should therefore be advocated for the reason that they present better chances for conservative treatment than when they have attained larger dimensions, either by rapid normal growth or by degenerative processes.

A comparison of the mortality of hysterectomy and myomectomy would seem to be rather in favor of the latter according to the

Name, age, date, married or single	Children, abortions	Symptoms	Number, size, location	Operation	Result
S. E.—Aged 36. Dec. 10, 1908. Single.	.....	Painful, profuse menstruation.	Interstitial and submucous. One pedunculated, submucous, size of walnut.	Resection of uterus. Left salpingectomy. Right salpingo-oophorectomy.	Has not menstruated since operation. No discomfort since the operation.
Mrs. F.—Aged 38. Jan. 27, 1909. Married one year.	No children.	Menstruated at 13. Regular, no pain, 2 days. Digestive symptoms.	Five, largest size grapefruit, four small. Subserous. At fundus and anterior surface.	Resection of uterus at fundus.	Menses irregular, scanty, much pain every month.
Mrs. K.—Aged 28. March 16, 1900. Married four and one-half years. Ref. by Dr. Cooley.	Two children, last one two years ago.	Menstruated at 15. Regular, no pain, 1 week. Vaginal discharge, backache, constipation, and vomiting. Headache.	One, large interstitial, and submucous and edematous. At fundus of uterus.	Resection of one-half of fundus. Left salpingo-oophorectomy. Resection of right ovary. Tubal attachment not distorted.	Menses every 5-6 weeks. Very scanty, 1 day. Headache, backache.
Miss S.—Aged 32. Oct. 31, 1910. Single. Ref. by Dr. Newcome.	No children.	Menstruated at 13. Regular, 3 to 4 days. Leukorrhea, pain in back and right side.	Multiple, largest size grapefruit. Left cornu. Interstitial. Bilateral dermoid cyst of ovary.	Resection of two-thirds of uterus. Right salpingo-oophorectomy. Left salpingectomy, resection left ovary.	Menses every 28 days. Scanty, 2 days. No pain.
Mrs. B.—Aged 23. Oct. 5, 1911. Married three years. Ref. by Dr. Fitzgerald.	No children.	Irregular menstruation for five years, often prolonged for weeks, growing worse.	Multiple, interstitial, size of adult head.	Resection of uterus. One-half removed. Tubal attachments not distorted.	Menses every month, regular, normal, 6-7 days. No pain.
Miss A.—Aged 23. March 18, 1912. Single. Ref. by Dr. Oye.	No children.	Menstruated at 15. Regular, lately profuse and prolonged. Leukorrhœa. Pain on urination.	One, size child's head, submucous, filling entire uterine cavity.	Resection of uterus and most of endometrium. Tubal openings possibly occluded.	Has not menstruated since operation. No pain since operation.
Mrs. D.—Aged 32. Jan. 26, 1900. Married 15 years. Ref. by Dr. Wilson.	No children.	Regular, profuse, 5 days. Painful, pain in back and right side.	Three fibroids, one size of lemon. Pyosalpinx, hematosalpinx, and ovarian cyst.	Resection of large part of uterine cavity. Right salpingo-oophorectomy, left salpingectomy.	Menses regular.

Name, age, date, married or single	Children, abortions	Symptoms	Number, size, location	Operation	Result
Mrs. S.—Aged 31. Feb. 5, 1913. Married 9 years. Ref. by Dr. Cossett.	No children, three miscarriages at three months.	Menses at 14. Regular, one week, profuse, backache, and bearing-down pain.	Multiple fibroids. Adnexa normal except for cob-web adhesions.	Resection of about one-half of uterine body.	Menses regular, normal, scanty, 5 days. No pain.
Miss B.—Aged 26. May 20, 1913. Single. Ref. by Dr. Donaldson.	No children.	Menses 14. Regular, 4-5 days, no pain. Flow excessive for part three and one-half years, 7-21 days, constant discharge.	Multiple, size of pea to marble, submucous pedunculated and interstitial.	Resection of fundus at right cornu including it.	Menstruation regular every 28-31 days, normal, 5 days, no pain.
Miss. C.—Aged 29. Sept. 9, 1913. Single. Ref. by Dr. Buchanan.	No children.	Menses 15. Regular, profuse. Pain in lower abdomen.	Multiple, subperitoneal, interstitial and submucous, parovarian cyst left side.	Resection of one-third of cavity and two-thirds uterine wall.	Menses regular every 28 days, rather scant, 5 days, slight pain.
Mrs. B.—Aged 25. Aug. 18, 1913. Married four months. Ref. by Dr. Heilman.	One abortion, produced, at four months. Cellulitis following.	Menses at 14. Regular, scanty and painful.	One large subperitoneal, anterior wall, one size egg, interstitial, posterior wall and several smaller ones.	Resection of uterus. Left salpingectomy. Right adnexa not disturbed.	Menses normal.
Miss S.—Aged 30. Dec. 2, 1913. Single. Ref. by Dr. Hershman.	No children.	.....	Interstitial, size of lemon, pedunculated size of hickory-nut and many smaller ones in wall. Scarcous cyst adenoma left ovary. Right ovary cystic.	Resection of uterus. Left salpingo-oophrectomy. Resection of right ovary.	Menses normal at first, quite profuse after operation, but lately quite normal.
Miss S.—Aged 31. Feb. 3, 1914. Single. Ref. by Dr. Bailey.	No children.	Menses at 13. Irregular, profuse, no pain.	One submucous size of grape-fruit, in posterior fundus. Adnexa enlarged but normal.	Resection of one-half of cavity and one-half of uterus.	Menses normal, 3 to 7 days, no pain.

experience of the writer. Since 1898 inclusive, during which time accurate records have been kept, 707 cases of uterine fibroids have been operated upon with a total mortality of 3.25 per cent. This does not include over a hundred cases in which small fibroids were removed coincident with other operations, but only those in which this neoplasm constituted the principal indication for operation. In these 707 cases, hysterectomy was performed 536 times and myomectomy, including the thirteen cases of extensive resection of the uterus here reported, 171 times. The total mortality in the latter cases is four or 2.33 per cent., while hysterectomy was accompanied by a death rate of 3.45 per cent. or more than 1 per cent. in favor of myomectomy.

The morbidity of myomectomy also compares even more favorably with that of hysterectomy, as the cases of myomectomy almost uniformly make a smooth, uncomplicated recovery, and almost without exception enjoy perfect health after the operation; they are, in fact, among the most satisfactory cases in the writer's experience.

In conclusion, I feel, therefore, justified in making a plea for more conservative treatment of uterine fibroids in younger women than they now receive in the hands of most general surgeons and many gynecologists. Myomectomy and the more radical resection of the uterus can be profitably performed in many women whose uteri are now ruthlessly sacrificed, resulting in many cases in long years of discomfort, unhappiness and often invalidism.

714 JENKINS BUILDING.

DISCUSSION.

DR. GORDON K. DICKINSON, Jersey City, New Jersey.—I began to do myomectomy ten or a dozen years ago, and when I met Dr. Cullen, of Baltimore, he told me he had several cases of death from embolism. I would like to ask Dr. Werder whether in his experience he has had any such deaths from embolism?

DR. J. HENRY CARSTENS, Detroit.—With me the question of fibroid tumor of the uterus, like any other question, depends upon the case. If I have a young woman who has one fibroid or two or three, I do a myomectomy. If she has a number of little ones I remove the uterus. I have taken out one side of the uterus, or about one-half, but have not systematically tried to save any uterine tissue by taking away half of it or one-quarter or three-quarters. It seems to me, it cuts very little figure whether you take it all away or half of it. If the ovaries are intact, and you leave them, it does not make any difference whether you take out the whole uterus or half of it. If they menstruate afterward or not, it is of no great importance because I do not think menstruation is of benefit to

these women. The question of ovarian secretion is important, and if you leave the ovaries the woman will go on just the same and never know whether the uterus has been taken out or not except she knows that she does not menstruate every month. If I were in the position of these women and was a young woman, and could have a part of the uterus removed, so that I could have children, I would rather have that operation done, and take my chances of having another operation performed at some later time.

As a general rule, fibroid tumors are bad things for a woman to have. If you do not do a radical operation the woman is going to have trouble, and surgery gets into bad repute. So I agree with Dr. Werder that in a *very few selected* cases I would perform that kind of operation.

DR. ROBERT T. MORRIS, New York City.—There is one important factor we are apt to forget, and that is the patient herself. Ask her what she wants done. I say to a patient who has these small fibroid tumors, that if we do a myomectomy, remove a part of the uterus and leave a part, you will probably have further development of this neoplastic growth because the original conditions persist. If you want me to leave a part of the uterus with the possibility of having further neoplastic growths, with the idea that in the meantime you may have a child, all right! One woman may say yes, then I leave it for her. Another woman may say no; then I take it all out for her, leaving the decision to the patient. I made four strips four years ago in a young woman of thirty, who had quite a number of these tumors. One strip on each side was not over one-third of an inch wide, but it carried broad ligament and ovary. I got two other strips fashioned and made a good uterus out of four pieces. It was such a nice looking uterus that I almost hated to close the abdomen over it and hide it from view. This patient is anxious to have a child. If left to my surgical judgment, with no moral question, no social or human question involved, I would have taken out every particle of that uterus.

DR. HUGO O. PANTZER, Indianapolis, Indiana.—What bearing the continuance of menstruation after partial hysterectomy has upon the health of these individuals, I cannot as yet answer to my satisfaction.

The importance of Dr. Werder's observations lies in the fact that he has greatly lessened the mortality when the uterus was not removed in whole. That makes a strong argument for his method. When we come to decide on operation on these cases, the question arises, shall it be a panhysterectomy or a supravaginal hysterectomy? In panhysterectomy parts are cut which are traversed by nerves and vessels contributing in common to the uterus, bladder, rectum and vagina, with the adverse consequence of materially damaging the nutrition and innervation of the bladder, the rectum and vagina forever afterward. As one effect of this must be designated the dry and itching vagina found in a limited number of cases which unfits these individuals for cohabitation. I recall the case of a woman,

twenty-seven years old, who three years before I saw her, had all her genitalia removed on account of epilepsy. She came to my clinic where I repeatedly demonstrated her case to classes. She had marked atrophy of the vaginorectal and vaginovesical wall, accompanied with gross impairment of function of bladder and rectum owing to the dystrophia.

DR. ROSS MCPHERSON, New York City.—Suppose a patient who has had plastic work of the kind described done on the uterus, does get pregnant, is she likely to have rupture of the uterus or can she carry the baby through? The latter seems to me to be very unlikely.

DR. JULIUS H. JACOBSON, Toledo, Ohio.—In reference to the x -ray treatment of fibroid tumors of the uterus, last year, after the meeting at Providence, Dr. McClellan and myself went abroad and we were very much impressed with the number of sloughing fibroid tumors which we saw operated in the clinics.

They were patients on whom x -ray treatment had been applied for the cure of the fibroid previous to operation. We got the impression that when these tumors were treated first with the x -ray, the mortality from operation was much higher. I would raise the point that the x -ray treatment produces nutritional changes and brings to operation a larger percentage of sloughing and infected fibroids for which we are obliged to do a radical operation.

DR. A. B. MILLER, Syracuse, N. Y.—There is one phase of the subject of fibroid tumors of the uterus that has not been brought out, and that relates to the treatment of the advanced cases. I feel that Dr. Werder has brought before us a paper which is along progressive lines. While our fibroid tumors are innocent growths, and so common with women, yet they are capable of degeneration to such an extent that it is necessary for us to get at them and remove them as speedily as possible. In these days we see very few large tumors as compared with those we used to see, and if this line of treatment which has been practised by every one, namely, myomectomy, can produce the results that Dr. Werder has pointed out, we should take advantage of it. The line of thought I wish to take up in this connection is with reference to fibroids in advanced age. From the fact that the menopause does not cease, many women will either not accept an operation, or owing to their condition associated with heart disease, general debility and anemia, it is impossible to subject them to operation without mortality. I have had under my observation six cases that have been treated in the advanced stage by the Röntgen-ray. These patients are doing nicely; they have been under observation two years, some of them three or four months, but the menses have ceased, and these women in general condition have improved markedly. We have not had any degenerations attending them. To my mind the mortality would have been excessive had they been obliged to submit to operative intervention. I am hoping that some one who has had experience with the advanced cases may have something further to say in this discussion.

DR. WERDER (closing).—In answer to the question asked by Dr. Dickinson about embolic deaths, I wish to say that I have had prob-

ably four or five deaths from embolism. They are included in this $3 \frac{1}{4}$ per cent. mortality, but I have only had one embolic death following myomectomy as far as I can recall, the others have been following hysterectomy.

In reply to Dr. Carsten who states that it makes no difference whether a woman menstruates or not, I must disagree with him. I am sure that these patients will also disagree with him because they are all anxious to retain their menstrual function above everything else, even if we are unable to save the power of reproduction. In the thirteen cases of resection, only five were sterilized, for the others pregnancy is at least a possibility. A woman whose uterus has been sacrificed will usually hesitate a long time before she consents to marry and probably few young men would be willing to enter the matrimonial state with such a woman. The retention of the uterus will make all the difference in the world in this respect.

In regard to the statement of Dr. Morris concerning danger of recurrence, I know of three cases of recurrence only after myomectomy. One case I operated nine years afterward and removed the uterus. The patient was a nurse. The first operation was performed when she was thirty years of age, the second operation at her thirty-ninth year of age. She has had about seven or eight years of perfect health between those two operations. While recurrences cannot always be prevented after myomectomy, they should not be common when the uterus is carefully examined and treated at the operation. With a resection such as described when the whole myometrium and endometrium down to the cervix can be thoroughly searched for the smallest nodules, recurrences should be very rare.

I fully agree with Dr. Pantzer in regard to pan hysterectomy. I do not perform that operation unless there is an indication for the removal of the cervix; a supravaginal hysterectomy answering every purpose without the objectionable features of a pan hysterectomy. I know there is objection to leaving the cervix on account of the possibility of cancerous development, but I have had only one case of cancer in the cervix after a suprapubic hysterectomy in my experience.

One gentleman seems to consider pregnancy a danger to these patients after myomectomy and resection. I have had at least a dozen cases of pregnancy following myomectomy and one patient mentioned in my paper has had four children since. These women went through labor as well as any others. There is absolutely no reason why pregnancy following resection should be more serious than that following a myomectomy.

I believe Dr. Miller's remarks in regard to the Röntgen-ray treatment is well taken. There are cases in which radiography is indicated in fibroid tumors of the uterus. I have one case under treatment by x-ray, the first of my cases so treated, she is very anemic and also asthmatic with rather bad kidneys. The operative risk of this case would be quite considerable, while with the x-ray treatment she has a fair chance of cure without such risk.

TWO CASES OF CANCER OF THE UTERUS APPARENTLY CURED BY POSTOPERATIVE INFECTION.

BY

JOHN W. POUCHER, M. D., F. A. C. S.,

Poughkeepsie, New York.

CASE I.—In June, 1906, I was consulted by Mrs. J., sixty-five years old. She had noticed a bloody vaginal discharge for a long time before she consulted her physician, Dr. Gerow, of New Paltz, N. Y., who at once sent her to a neighboring hospital where the surgeon, after an examination, discharged her as inoperable.

It was several weeks after her return home that she came to me very anxious to take the chances of an operation rather than to go on feeling that she was doomed to die by inches. Although she presented all the local signs of an advanced cancer of the uterus, a copious bloody purulent and very offensive discharge, a large cervical mass, and a rather large, soft, infiltrated uterus, her general physical condition was fairly good.

I finally agreed to undertake the operation, giving her family very little hope that it would do any good. The hysterectomy was a very difficult one, owing to the breaking down of the soft cervical mass and the infiltration of the surrounding parts. Indeed, there were several masses on either side that I was obliged to leave. The operation was followed by copious suppuration, both from the vaginal and abdominal drains, which kept up with only a moderate fever for the next ten days, when it began to grow less and her condition became normal. The wound healed rapidly, and on July 21, 1906, twenty-four days after the operation she went home apparently cured. Of course, I expected to hear that the trouble had recurred in a few weeks or months at most, but as time went on and I heard nothing from her, I took it for granted that she had probably died from a recurrence. But on December 17, 1912, more than six years after the operation, she came back to me for advice about a rather large hernia at the site of the abdominal incision. A careful examination of the abdomen and pelvis showed no return of cancer. Since this visit, about two years ago, I have heard nothing from her.

CASE II.—October 1, 1912, I was consulted by Miss M., aged forty-three. She gave a history extending back for more than two years of a vaginal discharge which at first had been merely a disturbed menstruation, then a continuous discharge which had finally become extremely offensive. She was extremely weak, emaciated and cachectic. Examination showed a large rather soft cervical mass and a large infiltrated uterus which could be easily palpated above the pubes. Her condition had been evident to her friends for a long time and they had urged her to consult a physician, but belonging to that extremely modest type of middle-aged spinster she had de-

clared she would rather die than submit to examination or treatment, and only consulted a physician when her condition had become unbearable.

Her condition was explained to her and her friends as practically hopeless, but having once started she was very anxious for an operation, and I finally consented to do what I could for her. Operation October, 9, 1912; abdominal hysterectomy. The uterus was found enlarged; the walls thickened and soft; the lower portion and cervix consisting of a large mass about the size of a man's fist, which broke down easily and which apparently had no boundaries as it implicated the posterior wall of the bladder; the whole upper part of the vagina and filled Douglas culdesac. This mass I could only remove piecemeal; and you may be sure I was not very proud of myself for having even attempted it. The prognosis was, of course, very bad. A profuse suppuration set in almost at once. The abdominal wound broke down. A large abscess formed in the inner side of the left thigh, which was opened the fifth day. In fact, there was a large amount of pus flowing from everywhere. The softened bladder wall sloughed and urine flowed both through the vaginal drain and through the abscess opening in the thigh. About the end of the second week the suppuration began to grow less; the wounds began to show signs of healthy granulation, and the patient began to show a decided improvement in every respect. In four weeks the wounds had all healed, the urinary fistula had closed, and the patient was able to sit up. November 25, 1912, six weeks after the operation, she went home apparently cured. She has been under close observation since and has remained in excellent health with no signs of a recurrence. She has maintained good health and spirits, and at the present time weighs more than she ever did.

In both these cases the laboratory report showed the disease to be adenocarcinoma and in neither of them could I claim to have removed anywhere near all the diseased tissues, consequently the cure must be attributed to some other cause, namely, the suppuration and the formation of a toxin that destroyed the cancer cells. There are, in the first place, areas of broken-down tissue filled with masses of dead cancer cells. The operation opens up fresh fields for their absorption. May we not have here a genuine autoinoculation of dead or modified cancer germs.

In going over the literature we find several instances of the spontaneous cures of cancer, and several pathologists with whom I have discussed this subject tell me that they have found post-mortem evidences of such cures. Is it, then, too much to predict that from this course there will be found a cure for this most dreaded of all diseases.

DISCUSSION.

DR. FRANCIS REDER, St. Louis, Missouri.—The essayist made one statement that I would object to, and that is, about modified cancer cells or dead cancer cells. We know that we cannot consider modified or dead cancer cells in such cases as he has cited. The condition in these cases which terminated so happily must be summed up in this way: here we have a cancer condition which fortunately at an early period had been walled off through inflammatory products, thus blocking the lymphatic channels until the cancerous organs were removed by the surgeon.

DR. GORDON K. DICKINSON, Jersey City, New Jersey.—Dr. Poucher did not refer to the experiments made by Coley, of New York, in which he has had some happy results from the inoculation with the streptococcus serum in sarcomas, and to a certain extent in carcinoma. He did not report any cultures made from the pus discharges from the wounds of his two patients. If he had done so and found the streptococcus germ, which Coley is making cultures from, it might be one step toward helping the profession.

DR. MILES F. PORTER, Fort Wayne, Indiana.—I would like to ask the essayist upon what basis he made his diagnosis of cancer in these cases. Does the diagnosis depend solely upon clinical observation or microscopic examination, and what was the nature of the cancer. In the second place, I would like to ask whether or not observations were made as to the character of the infection we have in these cases. These are questions, it seems to me, of the utmost practical importance.

DR. CHARLES W. MOOTS, Toledo, Ohio.—Six years ago I did a panhysterectomy and removed both ovaries and tubes in a woman who had adenocarcinoma of all these organs. The diagnosis was made by a pathologist of Ann Harbor and also by a pathologist of the Johns Hopkins Hospital. The woman is now perfectly well and is living in Detroit. She has gained 75 pounds since the operation.

DR. POUCHER (closing).—In answer to Dr. Porter, I would like to say the microscopic examination was made from specimens removed at the time of the operation. I stated that in my paper, and the disease was undoubtedly adenocarcinoma, and diagnosed by a very capable and skillful pathologist. I am very sorry to say, these cases occurred so far apart, that I had almost forgotten the essentials of the first when the second one occurred, and that was why no microscopic examination and no investigation was made as to the character of the discharges.

I have reported them as I thought they might be of some interest to the members of this Association.

FACTORS DETERMINING THE MORBIDITY OF SURGICAL CASES.*

BY

C. W. MOOTS., M. D., F. A. C. S.,

Toledo, Ohio.

THE question of mortality has been pretty successfully and universally solved for the past decade, but many patients are not yet receiving the advantages of all the refinements which lessen the period of morbidity. Quite a large percentage of those needing surgical attention are of the laboring or producing class, and our aim should be to use every possible means to return them to normal health and to their usual occupation in the briefest possible period of time.

Standing preeminently at the head of influencing factors is the surgeon himself. So important is he, that we could very profitably spend all the time allotted us in discussing his character, training and special qualifications which are so necessary in order to bring to every case all that is due the patient. However, so much is being written upon this point, and so much will be done within the next few years, that we will dismiss it rather summarily with the observation that it is most fortunate for the public that the days will soon be only a memory when a physician with no pathological or technical training may go to one of our large clinics for ten days and return to his community a full-fledged operator, even though not a surgeon.

Next in importance is the making of a proper diagnosis of the conditions to be met. Every possible means should be brought into play to make a positive diagnosis, that the work may be well planned so as to insure its completion in the briefest possible time. This is especially true concerning work upon the gall-bladder and other organs in the upper abdominal region. I would not advocate haste, but rather that speed which comes with much thought and training and a certain gift. Unfortunately a few surgeons never acquire the manipulations which mean the best kind of work in the shortest possible time, and will therefore never obtain the highest ideals in morbidity, for surely with all other conditions equal, the convalescing period will be in ratio to the time occupied in doing the operation. This is due not more to the question of the amount of anesthesia than

* Read at the Annual Meeting of the American Association of Obstetricians and Gynecologists, Buffalo, September, 1914.

to the fact that a qualified, skillful operator who knows his anatomy and does not become disturbed by unexpected pathology, will produce the minimum traumatism to the tissues involved. A properly worked out diagnosis also particularly affects the subject under discussion in troubles in the right side of the abdomen. Many a case has been opened too hastily for indefinite symptoms on the right side, a fairly normal appendix and a small cystic ovary removed, but the patient does not get well. A more careful study of the history of the symptoms, aided by the *x*-ray and ureteral catheter would have shown the trouble in the kidney or ureter.

We come now to the almost equally important element, the preparation of the patient. By preparation I do not refer alone to the use of purgatives, skin disinfectants, and other technical means, but to everything that possibly can be done to shorten the morbidity period. The thing that stands out above all others in this rôle is the psychical attitude of the patient. This must depend to a great extent upon the personality, training and reputation of the surgeon. Many men fortunately are endowed by nature with the qualities that immediately beget confidence; others may obtain them by years of training. To be a successful surgeon, as viewed from the standpoint of morbidity, these qualities are absolutely essential.

After giving this phase of the subject study for years, I am convinced that a proper mental attitude of the patient is a most important factor, and to secure which implies that great care must be maintained in the selection and training of nurses, assistants, and anesthetist as well as of the surgeon. In fact, all adverse stimuli must be abolished. Thus a cheerful and hopeful cooperation of the patient will be secured, and she will approach the operating ordeal without injury to the brain cells and will offer the highest possible resistance to all pathological conditions, and surgical trauma. Looking forward to the postoperative training, we must certainly condemn in no uncertain terms the management of the hospitals that permit relatives and friends of the patient to frequent operating rooms and witness the operation. To begin with, it smacks of quackery, gives the relative, whose judgment on this question is worthless, a distorted view of the whole matter and opens the way for repeated and morbidly magnified descriptions of unimportant details, thus creating the worst kind of psychology in the patient, and prolonging the morbidity into months and even years. And this is only one of the many reasons against the practice.

The abandonment of a long course of preparatory treatment, especially the administration of purgatives which remove fluids from

the body, has marked a big improvement in both morbidity and mortality. It is all well enough to treat some conditions before any attempt is made to procure a cure by surgical means, but in the majority of cases, the shorter the period of time that elapses from the notification of the patient that a surgical procedure is necessary until it is done, the better. The mental attitude of the patient is so much better that this more than compensates for anything tending to argue against it. Of course, this does not imply any of the "rushing off" to the hospital methods, which are sometimes employed, but refers to the time following a careful study and diagnosis of the case.

After the surgeon has gone carefully into the history, made a correct diagnosis, and done everything possible to keep the patient in an optimistic and pleasant psychical mood, what are some of the things that can be done in the hospital, which will affect the subject under discussion?

First of all, all preparations of the patient should be as simple and undisturbing as possible. No haughty and commanding orders from nurses should be tolerated. Rather, the nurse is to be a companion. The field of operation is to be prepared in a thorough, but unpretentious, undisturbing manner. The patient is given water freely, which has a marked beneficial effect upon the blood pressure.

The selection of an anesthetic is now of paramount importance. First of all, shall it be local or general, or a combination of both, and always preceded by the hypodermic administration of narcotics?

After making a careful study of the use of local anesthesia in foreign clinics, I am convinced that we do not rely upon this form of anesthesia frequently enough. I am also convinced that it can never be used in America as in Europe, unless one has a class of patients that are rather below the average in their esthetic development.

The selection of a general anesthetic is an important factor. The use of ether by the present mode of administration has solved the question of mortality rate in all cases having fair resistance. There exists, however, a certain percentage of cases that cannot withstand both the operation and the anesthesia produced by ether. Therefore, many surgeons are content to use ether as a routine, but when an exceptionally bad risk appears, they demand an expert anesthetist and nitrous oxide-oxygen. It is well to note the manner in which these two agents produce anesthesia and then one understands why ether takes second place in a "border-line" case or very bad risk, even as to mortality. Ether produces anesthesia by dissolving the lipoids of the brain and other important structures. Be-

sides affecting the red blood cells, it also puts to rest the phagocytes. Nitrous oxide produces anesthesia by simply interfering with the use of oxygen by the brain cells.

This knowledge of how these two agents act should alone guide us in the selection of a general anesthetic, if we are willing to do all that is possible to lessen the morbidity as well as the mortality rate. The matter of having an expert anesthetist must be solved if we would bring to the patient all that she justly demands. I believe that the average surgical risk has a right to all the refinements known as well as the very bad risk. It is certainly unfair to any method of anesthesia to use it only in cases in which one is afraid to use ether, and then point to an occasional bad result.

For a long time nitrous oxide-oxygen was heralded as being indicated in short minor operations. To-day we select it above all others in operations requiring great length of time. True, we had, in our early experience, considerable difficulty with it because of the rigidity of the abdominal muscles, but as we learned to operate with a lighter hand and less traumatism, we had scarcely no difficulty in this respect; finally, when two years ago, we commenced to use Crile's principle of anoci-association all difficulty with muscular rigidity disappeared.

We have tried to study the subject without prejudice, and conclude that the question of morbidity is more nearly solved by the combined use of the preoperative hypodermic administration of a proper dose of a combination of some form of opium and scopolamin, to the point of securing the "twilight sleep," followed by the proper administration of nitrous oxide-oxygen, together with the application of Crile's anoci-association, than by any other method. It requires the combination of the three principles to secure the ideal. The determination of the size of the dose of each of the preliminary narcotics to be used, is very important, and, if possible, should be determined by the anesthetist after a careful examination of the patient and with full knowledge of the work to be done. The ideal will not be reached by having a standing order for the same dosage for all patients.

The position in which the patient is kept during the operation has quite an effect, both upon the mortality rate and the morbidity. I have always objected to the use of the extreme Trendelenburg position, although often making the surgeon's work easier, and am in warm sympathy with the recent articles of Dr. Gatch upon this subject. Together with Gann and Mann, he has shown by animal experimentation that the three principal factors in causing heart strain are, Trendelenburg position, pressure on the abdominal viscera, and struggling of the patient. In importance, these rank in the order

named. "Experiments on dogs under anesthesia were striking. Only four of fifteen dogs lived in the Trendelenburg position over one and one-quarter hours unless revived by artificial respiration, the same results always being noted, viz., slight increase in the blood pressure, slight increase in pulse rate and increasingly labored breathing, finally ceasing. When the breathing fails, the heart, poorly supplied with oxygen, has to pump a blood supply made greater by gravity against a blood pressure increased by asphyxia. Asphyxia injures the cardiac muscle and raises blood pressure, while the Trendelenburg position causes an increased amount of blood to be quickly returned to the heart."

The matter of sutures is of grave importance. Americans are pretty well united in the opinion that absorbable sutures mean a shortening of the convalescing period, provided there is no infection and no giving way of the sutures. The secret is to use material that is sterile, as well as the smallest size necessary to hold the strain put upon it, and that which will be absorbed immediately after its function has been completed.

Finally, the operation must be done without apparent haste, yet in the briefest time possible, all raw surfaces covered over if there has been interference with abdominal or pelvic organs, fluids started in the system at once, meddlesome hypodermics during and after operation discarded, and the proper mental suggestions made, so that the patient goes home without feeling she has undergone an "awful ordeal," instead of being taught that she had a narrow escape and only her particular surgeon could have saved her. In most cases, no belt or abdominal support should be worn. The abdominal muscles atrophy just as well as the arm muscles when bandaged. Besides, all unnecessary apparatus causes bad psychology. Excepting infected ones, the abdominal cases should be moved about, and be up in a chair much sooner than was formerly supposed.

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DISCUSSION

DR. GEORGE W. CRILE, Cleveland, Ohio.—Dr. Moots has covered this broad and most important subject in so satisfactory and comprehensive a manner that there is little, if anything, to add to the list of factors he has enumerated as affecting postoperative morbidity.

I would perhaps emphasize even more that he has done the importance of *delicacy* in the operative technic. In our clinic we add to the technic described by Dr. Moots—or rather, I would say that our complete associated technic includes, in abdominal operations especially, the injection of quinin and urea hydrochlorid at a distance

from the wound. By this means postoperative pain and gas pains are minimized or in many instances wholly prevented. I would emphasize the necessity of making this injection *at a distance* from the incision as thus delayed healing of the wound will be prevented, while the whole traumatized area will be affected by this local anesthetic whose effects last from twenty-four to forty-eight hours.

I would like also to emphasize the value of the use of morphia not only as a postoperative sedative but during and after the operation in those cases in which the patient's energies have been so exhausted that the further drain upon them by the operation might prove fatal. In cases of acute infection demanding emergency operations morphin is of especial value, for as we have proved morphin protects the brain not only against exhaustion caused by trauma, but against that caused by infectious processes as well.

Of greatest value is the point which Dr. Moots has emphasized indirectly throughout his paper, that the individual patient is the central point of each operation. His individual needs are to be considered at every step and his eccentricities of temperament as well as of physique respected so that before, during and after the operation there may be no rough points of contact.

THE PRESIDENT.—I would like to ask Dr. Hewitt, of Detroit, to take part in this discussion.

DR. H. W. HEWITT, DETROIT, MICHIGAN.—I consider it an honor to be asked to be a guest of this Association, and it is a greater honor to be asked to take part in this discussion. I have been very much interested in the paper of Doctor Moots, inasmuch as I have been working along the line of anoci-association for about two years, and during that time have done in the neighborhood of 300 laparotomies. At first, my results were not good, but this was due to faulty technic. I visited Crile's Clinic a second time, watched him more carefully, and found out where my mistakes lay. I returned home, took more time in doing the operations and was able to eliminate these mistakes, thus securing good results.

What Crile especially emphasizes in connection with these patients is team work. When a patient enters the hospital, he or she, as the case may be, should be tactfully handled by nurses and orderlies, interns and surgeons.

The night before operation we usually give the patient a large dose of some hypnotic. Lately we have been using veronal. This gives them a good night's sleep. Early in the morning, before the effect of the veronal has worn off, we give them one or more doses of morphin and scopolamin, or morphin and atrophin. When we use two doses of morphin and scopolamin or narcophen and scopolamin, it gives the patients the so-called twilight sleep. We have taken them to the operating room without their knowing where they were going. I have visited these patients after operation and had them ask me when I intended to do the operation.

With regard to the morbidity, if we use these preliminary drugs, if we use nitrous oxid and oxygen anesthesia given by an expert, if we are careful to inject every tissue by novocain (either one-half

or one-quarter of 1 per cent. solution) before the tissues are cut, it will certainly protect the brain cells from exhaustion and prevent shock. If there is one thing we can say in favor of anoci-association, it is that it prevents shock. This does not mean so much in the ordinary risks, but in the bad risks it means everything. We have saved a number of patients by the technic of anoci-association who otherwise would have been lost.

In listening to Dr. Reder's paper yesterday, with regard to tympanities, I was quite interested. When we use the technic of Crile, and especially when we use quinin and urea hydrochlorid, injected a distance from the wound, we find that there is very little tympanites. In over 90 per cent. of the cases there is no tympanites. We strap the abdomen tightly with adhesive plaster, and it is seldom we have to loosen the adhesive plaster until necessary for the removal of the sutures. These patients have very little postoperative pain. I have been able to remove some appendices in patients who have had no postoperative pain whatever. I think we will be able in time, when our technic is more nearly perfected, to steal the appendix, as Crile steals the thyroid. If we can steal the appendix we can steal the gall-bladder without the patient's knowledge.

It would seem that with the absence of shock, with the freedom from postoperative pain, and with the rapid convalescence, that the morbidity following operations should be greatly reduced.

DR. MATTHEW D. MANN, Buffalo (by invitation).—I thank you very much for the privilege of speaking before this honorable body. I am very glad you have chosen Buffalo for your meeting-place, and sincerely trust that you will enjoy your stay while here.

The paper to which we have listened touches a great many fundamental points, and it will be impossible for me to discuss all. I am very glad Dr. Moots has taken up the matter of pain in the right side. This is often due to trouble in the ureter and sometimes we find it in the left side due to the same cause. I do not know how many times I have seen cases just about to be operated on or which had been operated on for the removal of the ovary or the appendix, where the patient was no better after operation, because the trouble was in the ureter. We have overlooked troubles in the ureter and bladder too frequently. The ureter can sometimes be palpated; sometimes it is so thick from inflammation that you can feel it distinctly. In many cases it is so tender that if you press on the right spot you will elicit pain and then you will know what the pain is due to. The ureter is just in front of, and to one side of the uterus in the anterior vaginal wall. You can locate it there very readily, and it is usually just at the mouth of the ureter, where the tender spot is. Often you can elicit pain by pressing the bladder between the finger and symphysis, pressing it upward against the bone, a sure proof of trouble in the trigone and base of the bladder. If that be the case, then a more careful examination of the bladder will show nature of the trouble.

Now in regard to catgut. In Buffalo we have used iodine catgut, prepared after a method originated in my clinic, by my son Dr.

E. C. Mann. The catgut is put in a solution of iodine in ether, not the tincture of iodine in ether, but iodine scales, and it works exceedingly well. We use a 10 per cent. solution, although it is not necessary to be exact. This solution when made can be used for years. It gradually loses its strength, and then more iodine or ether may be added. It never becomes infected. No germs can live in any such solution. The catgut is dropped into this bottle just as it comes from the manufacturer and left in, according to the size of the catgut, from one to five days. Then pick it out, dry it or keep it in absolute alcohol, which ever you like. I have used such catgut for ten years, as have Dr. King and others, with great satisfaction. We have had no stitch-hole abscesses from it. It lasts a little longer than ordinary catgut; that is, it does not absorb quite so quickly. I do not think I have ever seen a single case of irritation or infection which I thought was due to the catgut, after having used thousands of pieces of it. I think it is decidedly the safest, easiest, cheapest and nicest way to prepare catgut I have ever found. There is enough iodine to kill any infection you may get onto it while operating and to resterilize it even after it has been handled. We do not make a practice, however, of handling our catgut and using it afterward.

I thank you very much for the opportunity of speaking.

DR. CHARLES L. BONIFIELD, Cincinnati.—Dr. Moots certainly read an interesting paper which, I am sure, we have all enjoyed, and he has taken up so many subjects and covered such a broad field, that within the five minutes allotted me I can only touch on one or two phases of it.

In my opening remarks I recall what an old teacher of mine very frequently said, "The world goes round and round, but it still keeps moving on." Dr. Mann will remember well, and many of us will remember less distinctly, the days when every laparotomy nearly was preceded by the injection of morphine, and patients were made absolutely comfortable with morphine until recovery took place or death carried them off. And then came Lawson Tait on the field, and if there are two things that Lawson Tait taught us, it seems to me they were that we must get through an operation as quickly as possible, without unnecessary traumatism, and that we must be more sparing in our use of morphine. I never had the pleasure of seeing that great operator work, but from what I learned from those who told me, he was not exceedingly aseptic, but he possessed great manual dexterity. He was able to do in a short time just that which was necessary to do and no more. He reduced the mortality of abdominal operations tremendously and taught the world pelvic and abdominal surgery.

Next to that in my mind was his teaching not to kill patients with morphine. I do not doubt, and I am willing to admit that the pendulum may have swung too far; that we have gotten too radical against morphine; that when our patients are suffering too much, there are times and places where morphine should be used, but that fundamentally morphine is bad for these cases cannot be denied. In the first place, after every abdominal operation that has ever been done,

there is a certain amount of infection. To get rid of that infection we depend upon the vital powers of the patient and especially on elimination. If our patient cannot eliminate; if her kidneys are not working well; if her bowels will not move after a reasonable length of time, she is overwhelmed by the poison and dies in spite of anything. Now, if there is anything we know about morphin, it is that it constipates the bowels, it stops peristalsis. Every doctor who graduates thinks he must stick a hypodermic in his pocket and go around shooting everybody who has a little colic, and so on. As the years roll around he uses it less and less frequently. Every text-book I have ever read on diseases of the kidneys tells us that morphin is an exceedingly dangerous drug to use in those whose kidneys are diseased. It interferes more or less with elimination, and in this way it dries up the secretions, so that morphin used in this way indiscriminately should be condemned.

The next point I want to make is that all of these things are very nice as we hear about them, but it is remarkable how well patients do without them. We were not killing them all before these things came around, and they were not all suffering the torments of the damned by a good deal. It is true, they had some pain.

Dr. Reder read a paper this morning. It was an excellent paper. There were a lot of good things in it, but he knows and I know and everyone of you know the minute the bowels move freely, and gas is passing freely, the patient is relieved. You will not have any more trouble with your patient. If you want to prevent the bowels from doing that, fill them up with morphin, and they will not pass any gas; you can relieve pain and distention with the morphin, but that is not relieving the condition that causes the pain.

Formerly, I was engaged in general practice for ten years, and if there is any one thing I learned in that ten years of the general practice of medicine, it was to simplify my prescriptions. I found that one good active drug was all I could use and watch at any time.

I found if I was giving one good active drug whose physiologic action and therapeutic effect I fully understood, I did not want to give any more to muddle it up. So if in the next six months I should call on any of my good friends to operate on me for gall-bladder trouble or for appendicitis, I pray you not to fill me up with other drugs, but give me ether in the old-fashioned way. (Applause.)

DR. J. HENRY CARSTENS, Detroit.—Several years ago I read a paper on a similar subject to that which the doctor has dealt with to-day. I want to commend him for bringing this subject before the Association. In my paper I emphasized the importance of cultivating the fine Italian hand. I do not like so much fuss and feathers. I have always made a plea for simplicity. When a patient comes to the hospital for operation, she is put to bed, and a nurse looks after her. If she needs an anodyne during the night to relieve pain, she receives it. If she does not need it, she does not get it. The nurse prepares the patient. She washes her, combs her hair, and keeps her mind occupied so that she is not thinking about the operation. I do not have my patients shaved when they are conscious. The

minute you shave them, their attention is directed at once to the operation and about the incision, things she did not think of before. It is a good thing to shave them, but it takes but a few minutes to do this after the patient is on the table. It is a great deal better to do it then. You can give the patient a good dose of morphin, and morphin has a wonderfully stimulating effect. Instead of cowards, it makes heroes of these patients. They have courage. In the old days they gave them large doses of whiskey to keep up their courage, but now a good dose of morphin, say one-eighth of a grain with atropin will do that. The patient is rolled into the operating room, and if my house physicians and nurses have not got everything ready, I want to know the reason why. When things are not ready it is liable to irritate one. As soon as the patient enters the room the ether cone is put over her mouth, so that it does not give her much time to think or to say anything. It is better sometimes to give the anesthetic in bed, but you cannot always do this in a hospital, and so the patient has to be rolled into the operating room and put under the influence of nitrous oxid gas first, and then after she is well under the influence of the gas we change to ether. After she is well under the ether the parts can be scrubbed again and shaved, and everything is ready. I thread my needles myself; I have the catgut ready, and I want to say that I use plain sterilized catgut, and not chromicized, not formaldehyd, nor kumul catgut, but plain catgut. My instruments are there and ready to be used. The instruments I use are very few, and no one handles them but myself, and I know what I am going to do. I have studied the case thoroughly and carefully and considered what complications I may meet, I do my work quickly, and I sew up the fascia with this plain sterilized catgut. These operations can be done rapidly. I do not let my assistant do anything in connection with the operation. He stands on the other side and looks on in silent admiration. I sew up the fascia carefully. If it is a clean case, I do not drain. I bring the skin together and use narrow strips of plaster, then I put a couple of large plasters around and that is all. The patient has not had much shock. I think the plan of anoci-association is unlimited. The patient is put on a stretcher after the operation; then I have my assistant give her 2 quarts of saline solution per rectum. The rectum may not hold it all, but if you give them enough so that it goes up to the transverse or ascending colon, they may lose a pint or two, but will always keep a quart. When this is done they do not need a drink for twenty-four hours. They do not want it. If you do not do that they are thirsty, then they require water to quench their thirst. Their blood-vessels are empty. They need liquid, and you give them this water. What is the result? With the water they will perspire, the blood-vessels will fill up, it will flush out the kidneys and eliminate a great quantity of effete material which, inside of twenty-four hours would cause trouble as a general rule. The patient begins to wake up and gets restless. Give her one-eighth of a grain of morphin and she will sleep for two or three hours. In the evening give her one-quarter of a grain of morphin with about one-one-hundred-twentieth of atropin,

then when she wakes up she is not thirsty, she feels all right, and gets along without any trouble. What makes me disgusted is to have a patient in the ward who belongs to some other practitioner, and who is allowed to cry and whine all night because they will not give her one-fourth or one-eighth of a grain of morphin, which would be sufficient to keep her quiet.

Dr. Bonifield spoke about Lawson Tait and his work. He was a crank on these little things. But what is the use of being such a crank. If patients require a small dose of morphin, give it to them. Do not give them enough to paralyze the bowels, but sufficient to keep them quiet and comfortable and let them eliminate. If you do that you will seldom have a case of gas pains or vomiting or any of these other troubles. These patients get along very well under such treatment, and in about ten days or two weeks you can take the plaster off. You will see the line where the skin has come together, and that is all you see. If I have a pus case, I will put in a few silkworm-gut stitches extra for fear the patient will dispose of the catgut too rapidly, but if there is no pus I do not do that. I do not give them any more morphin after that. If I have trouble with house physicians, it is that they want to stuff my patients with some remedy. I give them nothing except all the drink they want, fill up the blood-vessels, flush the kidneys and eliminate effete material. I may give them a glycerin enema, and if this is done in forty-eight hours there will be little or no trouble, or very little immobility on part of the intestines.

DR. ERDMANN.—I would like to ask Dr. Carstens how he prepares his catgut.

DR. CARSTENS.—The catgut I use is put up in packages and is already sterilized. My catgut is not chemicalized; it is plain sterilized catgut without the use of any chemical. Some of the patients I have operated on, where I have used chromicized catgut or other kind of catgut, have gone home and in about three months thereafter have had a cold abscess or something like that. The catgut would not absorb, and this scared them very much. I use catgut that I know will be absorbed before the patient leaves the hospital, and then she will have no such trouble. That is the reason I do not use chromicized catgut, not even in hernia operations.

DR. EMERY MARVEL, Atlantic City, New Jersey.—It seems to me, the question of morbidity is one of the most important we can consider next to mortality. If I interpret Dr. Moot's paper correctly it deals with the immediate morbidity. In connection with which there are three factors which come up for consideration in this discussion. I think it is right for us to assume that quite a degree of perfection has been attained in the diagnosis of disease before surgical treatment is applied. Assuming that is true, how can we make the impairment of health of shorter duration, and the return to absolute health more nearly complete?

In speaking of the immediate morbidity Dr. Moots referred to the preparation of the patient. I have been recently impressed with the inconsistency of the teachings in regard to the prepara-

tion for a surgical operation, particularly that teaching which directs complete elimination of the gastrointestinal contents. I mean now the starvation for a day, or days, before operating. This places the patient in the very position in which we do not desire that patient to be in—exhaustion. It is time for us to discontinue starvation and have the patient take nourishment up to a few hours before the operation. The stomach in a normal condition will empty itself in from six to eight hours. A patient taking a meal twelve hours before operation will have the stomach empty by the time the operation is done, and there need be no fear in the majority of cases of the food not being properly assimilated.

The time of waiting before an operation is undesirable. The psychic influence of waiting, anticipating operation, I cannot consider as being good. The question of building up these patients before operation, as suggested by our medical confreres of preparing them for the ordeal of operation, is not well taken. The condition of the mind with an operation continually being considered is not favorable for betterment. If a patient did not have a disease which requires an operation, an operation would not be done. Therefore, the cause for the operation ought to be removed promptly. The morbidity brings us to the suggestions on the part of the physician. One case comes to my mind of a patient who was confined to her room as an invalid for four years. She was implored by her physician to keep quiet after the operation and this suggestion upon the part of her physician remained with her though no justification was evident. This illustrates very emphatically the condition that prevails, and I think great emphasis should be given to the surgical convalescent patients that they can do. There are too many *donts* and not sufficient *dos* to prevent the remote morbidity, Dr. Moot has not said much about the remote morbidity, and there, it seems to me, we owe a responsibility to society and to the state. One statistician has computed, that each life is worth to the state \$2500, and every time life is held in a condition that he cannot give the state its earning capacity it behooves our effort to shorten the invalidism. I wish to express my pleasure to Dr. Moots for bringing this subject before the Association and having treated it in so excellent a manner.

DR. MOOTS (closing).—I am in hearty accord with nearly everything that has been said in the discussion on my paper, and I wish to thank the fellows for their free expression of opinion.

Dr. Marvel's remark about the physician's statement to the patient impresses us forcibly, and I trust I will be pardoned if I speak of that just for a moment. How many times do we as surgeons find a patient to whom the doctor has said before we see the patient, that after this or that operation you must be careful a year or two years; you must not run a sewing machine for a few months; you must not go upstairs for three months and all that tommyrot. If we handle these cases right, the ordinary abdominal case should be able to go home in two weeks, and a housewife should be at her usual vocation in three or four weeks. Why? Because she will get her mind off herself.

As to the remote morbidity of which Dr. Marvel speaks, I think we will never accomplish what we should in that regard until hospitals have a better system of keeping track of patients. In other words, we must study the product of the hospital with all that that implies. The social service must be considered and everything of that kind. We can never shorten this period of morbidity, especially remote, whatever we may do as regards technic, until those of us who are compelled to work in semi-public hospitals can get the managers of these hospitals to stop the visiting by laymen in the operating room. You cannot do it because a brother, a cousin, or a friend of the woman goes home to the little town in which she lives and describes in detail everything that you do and everything that you do not do, and by the time the patient gets home the people have been told that the surgeon took her bowels out, laid them out on the table, put them back again, and on Sunday morning John tells her about it. Next week Mary tells her, and this goes on for months and months. We must stop that sort of thing if we would get the right kind of morbidity.

MINERAL SPRINGS OF SARATOGA.*

BY

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Saratoga Springs, N. Y.

I FULLY realize that a paper on the mineral springs of Saratoga can, at best, have but a remote bearing on our usual subject matter. However, in view of the prominence into which our springs have recently come because of their purchase by the State, I trust that a brief resumé of their history, constituents and clinical action may prove of interest.

At Saratoga, there is an area of about 3 square miles which, because of the number and variety of the mineral springs contained in it, is unique in the history of the world. Mineral springs, as we know, occur throughout the United States and the continent of Europe, but in widely separated localities; while in the area mentioned at Saratoga are found sulphur, iron, alkaline and saline waters within a few hundred feet of each other.

The origin of these springs has been discussed by eminent chemists and geologists at much length, since their first discovery, and

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their theories have differed widely. On one point they are agreed, and that is, that volcanic action, occurring ages ago, was the cause of the fault or break in the earth's crust, which is some 36 miles long, runs generally north and south, and extends through the area in which the springs of Saratoga are found.

A review of the theories concerning the origin of these springs is not within the limits of the time at my disposal. There are, however, several very interesting problems necessarily connected with any theory as to the origin of these waters:

A. The source of the carbonic acid gas;

B. The source of the bicarbonates of the alkaline earths, magnesia and iron;

C. Why all the drilled springs should be found in the limestone near the surface of the earth; and

D. Why all the drilled springs are found east of the fault.

Some eminent theorists seek to account for the carbonic acid gas, which is present in large quantities in these waters, by referring its origin also to volcanic action. If their theories are correct, then this gas has been stored up in some mysterious way for ages, in enormous quantities, and is capable of being liberated continuously, at a uniformly low pressure, as it occurs in our springs.

While I do not flatter myself that I can make clear what so many, wiser than I, have only succeeded in making cloudy, yet I submit a few points for you to think about; for, as has been said, "a theory, to be of any account, must tally with the amplitude of the whole earth." To me it would seem that the gas found in our springs must be evolved from carbonates by heat, the same reaction occurring as in an ordinary lime kiln, where the carbonate is reduced to an oxide, and the carbonic acid gas is liberated. It seems rational to conclude that the process by which this gas is evolved is constantly going on; and theoretically it must be in the interior of the earth, at a great distance from the surface, if heat is the cause of the reaction.

All the drilled springs at Saratoga are found in a strata of limestone, which in this locality is at the earth's surface, being covered only by shale, slate, and earth of from 100 to 500 feet in thickness.

If we try to theorize on the origin of the bicarbonates of the alkaline earths, magnesium and iron, we must first mix the carbonic acid gas with the waters of subterranean streams, somewhere within the earth, and have it reach the strata of limestone, where are found the carbonates of these substances. For when water contains an excess of carbonic acid gas, it can act as an acid; and when it flows over, or percolates through rocks containing the alkaline earths, it

can convert the carbonates into bicarbonates of the corresponding bases.

It is curious to note the fact that in penetrating the limestone with a drill, veins of water of varying mineral strength will be met at different depths; and in some instances the desired water from a particular vein has been used and the other veins excluded. The varying quantities of mineral constituents, found in the different springs, may be explained upon the theory that different strata of limestone contain varying amounts of these chemicals. In some instances, it would appear that the different strata are hermetically separated from each other, as the waters from springs situated near each other vary materially in composition and character; and frequently springs are not influenced at all by the pumping of adjacent ones.

The first spring found at Saratoga was the one known as the High Rock. The water originally found its way to the surface of the earth unaided. As it flowed, the carbonic acid gas escaped, and the carbonates of the alkaline earths, and of the iron, were precipitated. This resulted in the accumulation at the surface of a mass of chemicals, which was spoken of as the "rock," and from this the spring took its name. Later, an excavation was made down to the bed rock from which the water was seen to flow, an inverted hopper was placed over this point, made tight with clay, and from the top of this hopper a tube was brought to the surface through which the water flowed. Later springs were similarly discovered and treated.

In 1870 the first spring was developed by drilling. When the water was confined in the drill hole to a small nozzle, it would spout from 20 to 30 feet; and so this spring became famous as the "Geyser" or spouting spring. Since that time all the springs at Saratoga have been developed in this way.

About the year 1885, a report was circulated that the springs at Saratoga were lost, a report as unfortunate as it was fallacious. This came about from the fact that business enterprise had begun collecting the gas from these waters for commercial purposes. At first this was done in a limited way; but, later, deep gang pumps were placed, which pumped 1000 gallons a minute, night and day, from which the gas was collected, while the water was wasted; in the early days, the total overflow from all the springs did not exceed 10 gallons per minute. Continuous pumping of this enormous quantity of water resulted in lowering the water level, and consequently the springs did not flow at the surface, though the gas and chemical constituents remained in the same proportion.

It finally became apparent that pumping must be stopped if our springs were ever to flow again. Accordingly the town's people were aroused, went to the Legislature for relief, and an anti-pumping bill was passed, prohibiting the pumping of the water for the collection of the gas. At about the same time the State appropriated a million dollars for the purchase and preservation of these springs.

The waters from all the springs have been recently analyzed by the State, and their analysis shows the value of the springs, and also the fact that the different springs vary in total solid content from 115 grains to the gallon in the very weak waters, to 1216.1 grains in the strong ones.

The mineral waters of Saratoga are of two types, the sulphur and the chloride. The sulphur are characterized by the quantity of sulphuretted hydrogen which they contain; the chloride types is essentially free from sulphuretted hydrogen, and is saturated with carbonic acid gas.

This second type may be subdivided into three classes, viz., the alkaline, the alkaline-saline and the chalybeate.

The elementary substances found in our waters are chlorine, sodium, magnesium, iron, potassium, iodine, bromine, barium and lithia. The chemists show them to exist in the following combinations.

ANALYSIS OF THE WHITE SULPHUR SPRING, TAKEN BY STATE
DEPARTMENT OF HEALTH, AUG. 25, 1913.

Chemical combinations	Milligrams per liter
Potassium chloride.....	4.47
Potassium sulphate.....	4.85
Sodium sulphate.....	25.08
Sodium bicarbonate.....	28.38
Calcium bicarbonate.....	208.21
Magnesium bicarbonate.....	83.10
Calcium silicate.....	28.25
Ferrous bicarbonate.....	1.59
Aluminum.....	0.99
Hydrogen sulphide.....	1.90
Nitrogen as free ammonia.....	0.094
Nitrogen as albuminoid ammonia.....	0.010
Nitrogen as nitrites.....	a trace
Nitrogen as nitrates.....	a trace
Oxygen consumed.....	0.80

ANALYSIS OF HATHORN NUMBER TWO.

Sodium chloride.....	10,652.45
Potassium chloride.....	958.50
Lithium chloride.....	76.53
Potassium bromide.....	69.20
Sodium sulphate.....	5.48
Sodium bicarbonate.....	697.75
Borium bicarbonate.....	56.66
Strontium, bicarbonate.....	2.28
Magnesium bicarbonate.....	2,844.70
Calcium bicarbonate.....	3,991.18
Ferrous bicarbonate.....	21.37
Alumina.....	24.41
Silica.....	17.60

Carbonic acid gas, range from one to three volumes, temperature 50° F.

It will be noticed from the analyses of our springs that they all contain about the same chemicals, and vary chiefly in the total quantity per gallon. A recently discovered quality of these waters is their radioactivity, announced by the National School of Mines, which is said to be due to dissolved salts of radium. While perhaps our enthusiasm on the subject of radium is out of proportion to what is actually known about its therapeutic action; yet we naturally believe that its presence in our waters is a valuable asset; and it may account for the unusual action they possess, and also for the fact that no one has ever been able to duplicate our natural mineral waters synthetically, either in taste or action.

The study of the physiological action of a mineral water presents many complications. The physiological chemist, when studying a compound substance, bases his conclusions on the action of the predominating chemical. There are, however, in our waters a number of chemicals present in small quantities, each having a positive action when taken alone, which might readily be a factor in clinical results. So I believe it is impracticable to attempt to base the value of our mineral waters on the physiological action of any one ingredient; which is the principal, and which the synergist, in such a complex combination of chemicals, can at best be only an inference. Naturally, the same features influence the action of mineral waters as other drugs, that is, the individual peculiarities and the immediate functional condition of the patient.

Clinically, these waters possess qualities, and produce results, not common to alkalis or salines when employed singly. When used either internally or externally, they exhibit two distinct qualities, which I shall characterize as the immediate and remote action. When

taken internally, the immediate results are to clean out the intestinal tract in a thorough manner, and at the same time increase peristalsis, removing pent-up secretions, and other effete matter which might have a toxic effect. They stimulate the natural secretion of the mucous glands of the intestines and gall-bladder tract, and also the functional activity of the liver and kidneys. Their action is aperient, cathartic, purgative, diuretic and antiacid, depending upon the quantity and type of the water and the time at which it is taken. As an aperient, the water from one of our strongest springs is usually necessary and should be taken before breakfast, the quantity being regulated by the individual peculiarity and the result desired. As a diuretic, the water from the same spring may be taken in small quantities, once in three hours, throughout the day. The milder waters, taken in larger doses, and at the same interval, are useful when alkalies are indicated, and will also act as diuretics; for this purpose they are preferable to the stronger waters, both on account of the greater quantity of water imbibed, and because of their more general palatability. These mild waters, taken before meals, will act as excitants of acid secretion; while following meals, they are a mild antiacid.

The remote action is the correcting of a perverted metabolism, of anemia, and many ill-defined morbid conditions, of a more or less chronic nature, caused by imperfect metabolism.

For external use, the waters at Saratoga have a most enviable place in balneology. I can state with assurance that they have served me well many times, either directly, or as a synergist to the water taken internally, when associated with a regulated régime. The results obtained from the baths depend upon the specific gravity of the water, the temperature, the period of immersion, the amount of free carbonic acid gas, whether a rub is given in the tub, or whether the bath is followed by a massage and proper rest.

The immediate effect of the mineral water baths, when charged with an excess of gas, is to lower the pulse rate, while the force of the heart beat is increased. The surface of the body takes on a glow, in some instances approaching an exanthematous appearance, and the body will be covered with bubbles of carbonic acid gas. The dilatation of the peripheral vessels thus induced relieves the congestion of the internal organs, and ultimately effects trophic changes and general metabolic processes, which are of course factors in remote betterment. Moderate exercise after a cold bath is desirable, while a period of rest in the open is best after a warm bath. These baths produce universally a temporary sense of stimulation,

followed by a period of lassitude, making the rest after the bath most enjoyable.

Our mineral water baths are of service in cardiovascular diseases, functional nervous conditions, with their concomitant manifestations, and obesity. Cold baths are contraindicated in almost every form of organic disease of the blood-vessels and heart. In exceptional cases they may be prescribed with caution. Saratoga baths can be taken colder than the ordinary bath, because of the stimulating of the peripherals by the carbonic acid gas.

So much for a very cursory review of the action of these waters; a very unscientific one, I concede; but even so; it is about all one can say, for the benefits derived are in large measure due to their association with a regulated régime. I attribute about 25 per cent. of the general betterment of the patient to the spring waters, and the other 75 per cent. to the régime followed.

We have heard so much about the wonderful cures at the European spas that a word in relation to them may not be amiss. When a comparison is made between the waters of Saratoga and those of Europe of a similar type, ours at Saratoga are remarkable in the quantity of free carbonic acid gas which they contain. In specific gravity, all are about the same. The temperature of the Saratoga water is 50° F., while those at Nauheim are 80° F. They must often cool theirs, while we must heat ours; either is done without modifying the gas or the chemical content of the water.

In what class of cases is the use of the Saratoga mineral waters indicated? The overworked, fagged-out business man of the day, with a train of functional derangements due to an exhausted nervous system (such as isomnia, loss of appetite, restlessness and general irritability); in conditions of constipation, catarrh of the bile ducts, congestion of the liver, gout, rheumatism, primary anemia, diabetes, obesity, and cardiovascular diseases, particularly arterial tension. Indeed, all subacute or chronic cases will be benefited temporarily, when a regulated life is followed, though they may have to return for treatment from time to time.

Constipation.—Our stronger waters are most satisfactory in cleaning out the intestinal tract, acting as an aperient or drastic cathartic as desired, depending entirely upon the quantity taken. I have found them very useful in those cases of habitual constipation in which vegetable cathartics have been regularly taken; the effect in these cases is not only immediate; producing a painless and satisfactory evacuation, but many are permanently benefited.

Functional nervous diseases are universally improved by the drinking of the water, cold baths, and mechanical exercises.

Urinary Tract.—Irritation, due to hyperacidity, is relieved by the alkaline waters; at the same time, the kidneys are washed out, possibly carrying along toxins that may be in the blood from an imperfect oxidation of food; naturally these are less irritating when the urine is diluted. Where there is a pathological condition of the kidney, the same care is necessary in the selecting of a mineral water, as in using other drugs. The quantity of urine secreted by the kidneys should always be known definitely before the mineral waters are prescribed. When the quantity is less than 16 ounces in twenty-four hours, the patient should be put to bed, and water withheld until renal activity is being reestablished, when the alkaline mineral waters will be found helpful.

Cardiovascular diseases, I find, are relieved, many times to an unexpected degree, and for this I have no explanation. Not only the heart muscle, but the character of the heart beat, it would seem, is brought nearer normal. The carbonated baths, rest, and the Schott exercises have been so long exploited, and the results reported so unusual, that it is natural enough that those who have not personally observed them should be skeptical. I assure you that they do have a most decided action on the whole circulatory system, when it is not in a state of degeneration; this may perhaps be due to the dilatation of the peripheral vessels relieving a dilated or thickened heart muscle, and then restoring its tone. In arterial pressure, free catharsis from the use of one of our strong mineral waters in the morning, with the alkaline water after meals, proper exercise and a diet low in caloric units, will accomplish wonders. It is often a question, when a patient is taking a mineral water cure for this condition, to what extent we should withhold such drugs as the nitrites, digitalis, strophanthus and strychnia. I believe we should use them when indicated, and not trust too much to nature.

Diabetes.—The alkaline waters, which may be drank very freely in these cases, are valuable, not only because of the alkalis, but because it is said, they increase the oxidation and the carrying qualities of the blood. We know they should neutralize the fatty acids in the blood, which are so disastrous in this disease when they are allowed to accumulate. These patients are inclined to constipation, and one of our stronger saline cathartics invariably proves efficient, producing one or more watery evacuations. In fact, I believe a diabetic does as well at Saratoga, with our waters and a properly regulated diet, as it is possible to do any where.

Obesity.—This condition is most satisfactorily treated at Saratoga; the use of one of the strong cathartic waters taken before breakfast, a hot mineral water bath or the employment of Prof. Baruch's electrically heated cabinet with the head in the open air, exercise, and a diet restricted to 2000 calories daily, will secure results that are most gratifying, without the exhaustion so common to these cases under other treatment.

When a physician sends his patient to a place like Saratoga for a "Cure," he should either direct him, definitely and specifically, or else send him to a local man for advice and observation. For the convenience of those men who may prefer to direct their patients, I shall venture a few suggestions.

The mineral waters of Saratoga are in no sense a specific, though they do possess unusual therapeutic qualities peculiar to themselves. I might add that the prevalent idea that each spring has a particular quality peculiar to itself, that is, that one is good for rheumatism, another for gout, another for dyspepsia, etc., is erroneous.

I cannot too forcefully suggest that the home physician emphasize the necessity of the patient's following the prescribed régime absolutely; and that any modification or omission of detail cannot be countenanced. Saratoga is not under municipal control, as is the case with the European Spas; neither are all the visitors in our village there for the purpose of taking a "Cure." Consequently our patients are very apt to act on their own initiative, or on the advice of some chance acquaintance. It is not uncommon to find a patient drinking indiscriminately an indefinite quantity of our waters, often with disastrous results. It is, moreover, essential that the waters should be taken at the proper time, if the best therapeutic results are to be achieved. Often a visitor believes that if he takes a pint of some strong mineral water in his room before breakfast, the drinking of which is followed by a free catharsis, he is progressing rationally and requires no professional attention.

It is unfortunate that we have at present no diet kitchen at Saratoga. The hotels are on the American plan, and it is therefore manifestly difficult to regulate the diet of a patient as we should.

An eminent physician has put our difficulties in this direction concisely when he says "it is not natural for a man to pay for birds and eat mush." However, when a patient has reached such a state of health that he is willing to go away from his home for treatment, he will, if properly advised, follow a prescribed course, and is usually ready to submit to personal inconvenience of habit.

I would call your attention to the following points:

A. Our climate is dry and bracing, and the air free from contamination of all kinds; our elevation is 360 feet.

B. All directions to the patient, as to hours of arising, retiring, bathing, taking exercise, rest, etc.—as well as the prescribed diet—should be carefully written down. Rich, highly seasoned foods, of a high caloric value, should be interdicted, quite as much as alcoholic beverages.

C. The patient must expect to stay not less than six weeks, if the greatest benefit is expected. This length of time will make it possible to follow the active treatment by a less strenuous after-treatment, though the régime should be no less methodical.

D. The waters should be taken *only* as directed. The strong waters sometimes produce hematuria in pathogenic conditions of the kidneys: and when taken in unusual quantities will produce an alkaline urine with its train of discomforts.

E. The physician should bear in mind that when a patient drinks a strong saline mineral water, he is getting 75 grains of mixed chemicals in each glass.

F. The physician must emphasize the fact that the waters, used internally or externally, or both, are only a part of the "Cure." A life regulated in every particular is imperative and this should comprehend the hours for food, sleep, rest, exercise, bathing, diversion, diet—in fact, the whole time of the patient during his sojourn.

The State has acquired many of the springs at Saratoga. The pumping has been stopped and the water is gradually resuming its original level. Analyses of the springs have, in the meantime, been made, and their authenticity is vouched for by the seal of the State. Two parks in the area of the springs have been laid out by the State; the High Rock is small but most charming with walks and benches for rest, in addition to its historical interest: the other comprises about 250 acres in the Geyser region and contains walks and drives, as well as many of the strongest springs.

Property has been purchased by the State, adjoining on one side the village park, and on the other the original Hathorn spring, on which it is proposed to erect a bath house which will be the equal of the best ones of Europe in every respect. It is also the intention of the State to construct a central drinking pavilion, to which the waters of the various springs will be conducted by piping.

The village has recently completed a most beautiful park in the center of the town, which serves our visitors for exercise, rest, and recreation. Open air concerts are arranged by the municipality and given three times a day by a popular band, and are free to our visi-

tors. There is also in this park a Casino or Curehouse, which for elegance and beauty is unsurpassed. This was the famous Canfield club house, which has been rearranged and suited to its present use. Here the visitor may enjoy rest, reading, and writing rooms, and an interesting historical exhibit. Many social affairs are also given here both in the afternoon and evening, to which visitors are made welcome.

511 BROADWAY

SOME OBSERVATIONS ON THE TECHNIC OF INTESTINAL ANASTOMOSIS, WITH SPECIAL REFERENCE TO A MODIFICATION OF MAUNSELL'S METHOD.*

BY

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(With nine illustrations.)

INTESTINAL anastomosis, or enteroenterostomy, is such a frequent procedure and one for which such a multiplicity of methods have been proposed and practised, that it may seem that the last profitable word concerning it has been uttered; yet there are few, if any, surgical problems of which this can truthfully be said.

The purpose of this unpretentious paper is not to offer anything especially original, but rather to recall and emphasize some cardinal principles relating to the subject and to recommend the revival of a technic which has fallen into disuse, perhaps for lack of a modification, which, so far as the writer knows, has not been applied to this method (although it is so simple and obvious that it would not be strange if others deserved the priority) and which, while slight in form, seems to add very materially to its efficiency—enough so, in our opinion, to make it the method of choice in the majority of cases.

The history of intestinal jointure is rather fascinating, but time forbids any extended reference to this aspect of the matter. Suffice it to say, that, like many other surgical proceedings, it has had its ancient, or at any rate medieval, and its modern phases. While the introduction of present-day methods of enteroplasty dates back no more than forty years, attempts along this line were made with more or less success during the Middle Ages.

Fabricus ab Aquapendente, in the latter part of the sixteenth

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century, says: "There are some fools who, before suturing the intestines, insert a cannula composed of elder pith or a piece of a dried artery of some animal or a bit of another intestine to avoid having the sutures carried away by the passage of food;" while according to Travers, the "Four Masters"—surgeon monks who practised in Paris toward the end of the thirteenth century—were credited with having used the trachea of a calf or a goose for the same purpose.

These crude efforts of the dark ages were, apparently, forecasts of the more practical and successful devices of modern times; of Neuber's decalcified bone cylinders, introduced in 1884, to be followed by Mayo Robson's bone bobbins, Senn's bone plates, Murphy's button and more recently Soresi's rubber tube, not to mention the various cylinders of potato, turnip, etc.

Another class of operators, including Lee, Laplace, Halstead and others devised ingenious mechanisms for holding divided intestines in place during most of the suturing, the few remaining sutures to be inserted after removing these supports; meanwhile sutures in all forms, Lembert, Czerny-Lembert, interrupted and continuous, mattress, right-angled, etc., multiplied.

It is safe to say that, in the effort to attain an ideal method of intestinal anastomosis, during the past forty years, dozens of mechanical devices and as many varieties of sutures have been offered but, in the natural process of evolution, surgeons of to-day have come to rely chiefly on either internal fixation or support by the nonabsorbable Murphy button or Soresi catgut-looped rubber tube or else by the absorbable Mayo Robson bone bobbin (all aided by or combined in some way with sutures), or, on the other hand, resort to an all-suture method consisting of an initial (inner) row, interrupted or continuous, involving sometimes the mucosa only but usually all coats, reinforced by a second serous or Lembert row.

It would seem to be good surgical practice to select from these few methods some one technic in which to become proficient and to use as a method of choice. Equally it would appear wise, in making that selection, to choose the one which most nearly approaches the ideal for the majority of conditions under which intestinal approximation or anastomosis becomes necessary.

This naturally raises the question as to what are the fundamental requirements of a sound and generally applicable method of this sort. The answer may be stated as follows: first, and foremost, the technic should result in a secure watertight joint even in the presence of a considerable intrainstestinal pressure from gas, while at the same time it should allow as much rapidity of execution as is compatible

with safety; second, it should lend itself to unfavorable as well as favorable conditions, for instance, to an emergency operation in a distant farm house as well as to one of election in a well-equipped operating room; third, it should be adaptable to the different varieties of intestinal juncture, such as end to end, end to side and lateral anastomosis; fourth, it should provide hemostasis in the cut intestinal edges and leave, eventually, as little narrowing of the lumen as possible by undue infolding or flange formation of these edges.

When one studies the methods in common use in relation to these fundamental requirements it must be admitted that most, if not all of them, produce a reasonably secure joint, but that two at least—the Murphy button and the Soresi tube—accomplish the result in less time than any method requiring a double row of sutures. It is questionable, however, if either of these consumes less time than a jointure by means of a properly applied single row; while sutures penetrating all coats of the intestinal walls give as great if not greater holding qualities than can be attained by any other technic.

Next, it is obvious that reliance on any technic which calls for the use of a mechanical device of any sort, absorbable or nonabsorbable, does not meet the requirements of adaptability to emergency operations under adverse conditions as well as an all-suture method, for the operator may not have just the desired appliance at hand, while it may be safely assumed that he always has needle and thread. Whether or not there is any justification for the fear that a non-absorbable device, like the Murphy button, may be indefinitely retained or may produce traumatism of the gut, it must be admitted that the surgeon who uses only a needle and thread for the purpose of anastomosis is wholly devoid of such anxiety. An objection to the Soresi rubber tube, carrying catgut loops, is that the number of stitches passing from one gut aperture to the other, in end to end anastomosis, is strictly limited to the number of loops carried by the tube and, where the segments to be approximated are of different caliber, I have seen an imperfect joint result. There is, moreover, the possibility that in using any of the more or less permanent intra-intestinal devices, which for a longer or shorter period, take up a great part of the lumen, the flow through them may become blocked on the proximal side by thickened masses of feces, thus establishing a secondary obstruction, a thing which does not transpire in the all-suture methods unless the bowel edges are unnecessarily infolded so as to narrow the lumen.

As regards the adaptability of the generally used methods to the

three forms of approximation—end to end, end to side and lateral—there is little to choose as they all serve those purposes about equally well. It might be remarked just here, however, that while some surgeons believe that the *ultimate* anatomical result of end to end and lateral approximation are scarcely to be differentiated—there being, after some months, practically as uninterrupted a lumen in the side to side juncture as in the end to end—there is a difference, in the *immediate* formation, resulting in a slower fecal stream in the lateral than in the end to end method, which is a matter of not a little importance where the operation is done as the result of a resection to relieve intestinal obstruction, a class of cases constituting a considerable percentage of the whole number demanding anastomosis. Here, at any rate, the end to end junction seems entitled to the preference.

Upon carefully weighing, therefore, the advantages and disadvantages of performing anastomosis on the one hand by the aid of some auxiliary device or on the other by the use of nothing but needle and thread—all-suture technic—the latter would appear to be the logical method of choice. If this be granted, it narrows the discussion to a question of preference for a technic dependent on either one or two rows of sutures. Without doubt the majority of those who, to-day, employ the all-suture plan are in the habit of using a double row and it must be admitted that, as a rule, the results are satisfactory; but in the writer's opinion, both on theoretical and practical grounds, the method is inferior to that which employs but one row of sutures, provided a technic be followed which permits a simple and direct manner of applying the same.

Two leading methods of anastomosis by a single row of through and through sutures have been advanced, the first by Maunsell something more than a score of years ago, the second by Connell about midway of that period. Each has one or more disadvantages that, apparently, have prevented their meeting with any general acceptance. The principal defects in Connell's method, which must be so familiar to all as to need no special explanation, are the waste of time in placing and tying a considerable number of mattress sutures (Connell's original suggestion) and the apparent difficulty in knotting of the last of this series or the termination of a continuous suture (Connell's second suggestion) so as to coaptate serosa with serosa. There is no doubt, however, that to Connell, more than any one else, is due the credit of demonstrating the superiority of the single through and through suture anastomosis; that in the first place it is more strongly retentive on account of penetrating all coats; that it is a distinct time saver by doing away with the introduction of a

Lembert row, which is always a rather slow process, and that the knot of a through and through suture should, to prevent leakage, be within the lumen of the gut, although it is questionable if, in the present use of the almost noncapillary Pagenstecher thread, that point is of more than theoretical importance.

The Maunsell technic, as originally proposed by its author, and as still described, by such text-books as choose to explain it at all, is open to several objections. Having been for so long a time comparatively obsolete, it may not be amiss to refresh the memory by intro-

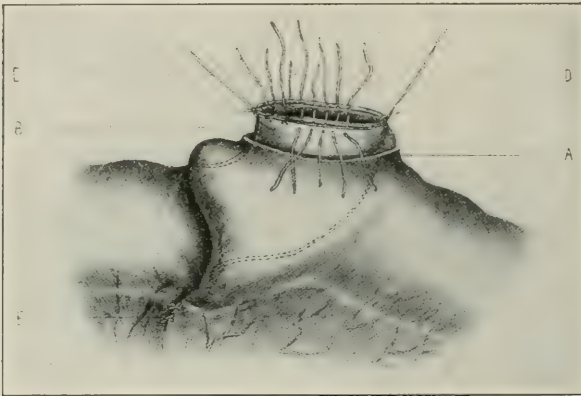


FIG. 1.—Entero-enterostomy by Maunsell's invagination method—the invagination accomplished. *A*, window in intussusciens; *B*, concentric ends of two pieces of intestine of equal size; *C*, antimesenteric traction-suture; *D*, mesenteric traction-suture; *E*, edges of mesentery sutured.—(After Bickham.)

ducing a brief description of the method. Its essential and unique feature is an invagination or intussusception of the open ends, in end to end anastomosis, or of the corresponding parts, in end to side or lateral anastomosis, through a secondary, nearby, longitudinal incision or window on the antimesenteric border of the gut, the invagination being brought about by two or more traction sutures uniting the edges of the apertures to be anastomosed or by substituting for the sutures two or more fine hemostats according to Ullmann's suggestion. The resultant invagination places the apertures to be united in the form of concentric openings, serosa applied to serosa and mucous surfaces exposed—in other words, in the most favorable possible position for accurate and rapid union by suture. Maunsell then completed the anastomosis by *interrupted* sutures penetrating all coats. The first objection to this method, and one which in our opin-

ion is practically negligible, when contrasted with the greatly increased facility afforded in suturing, is the time involved in making and closing the small window as well as the slight additional trauma inflicted. The time consumed in making and closing a straight incision an inch and a half long on the convex border of the intestine does not amount to more than two or three minutes at most and can fairly be left out of the question and the danger attached is practically *nil*. If there is any prospect of its longi-

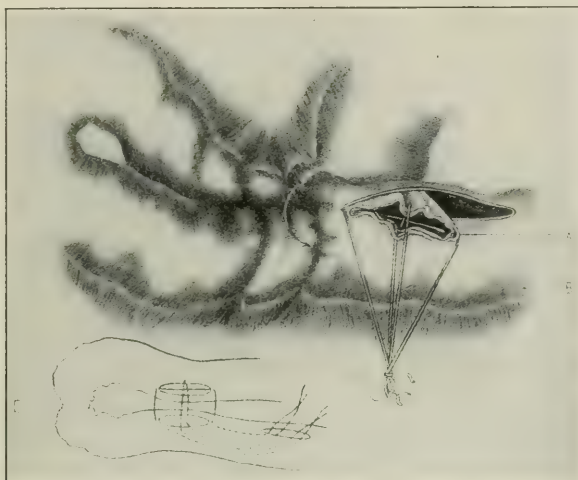


FIG. 2.—Lateral intestinal anastomosis by Maunsell's invagination method. *A*, intussusceptum drawn through window; *B*, intussusciens, with window in its antimesenteric aspect; *C*, diagram showing manner of placing traction sutures.—(After Bickham.)

tudinal closure unduly narrowing the intestine it can be closed *à la* "Heineke-Mikulicz," in that way widening instead of narrowing the lumen.

Another criticism of the Maunsell technic, and in this case a valid one, is that it makes use, in the anastomosis, of *interrupted* sutures. This appears to be a mistake in several ways; first, the introduction and tying of numerous single sutures is a waste of time; second, there is a possibility of inverted gut edges held by interrupted sutures slipping past one another, owing to gas pressure within, before serous adhesion has become effective, with consequent leakage of intestinal contents; third, such sutures exert no hemostatic effect on the raw edges between them. To these objections may be added that they do not insure the ultimate necrosis and disappearance of

the inverted edges, or flange, thereby leaving a more or less narrowed or obstructive zone at the situation of anastomosis—a defect which is even more apparent in the commonly used technic of two suture rows.

It must be self-evident that all of these objections applying to the technic by interrupted sutures disappear with the substitution of a *continuous, locking* suture. Such a suture should begin at the approximated mesenteric borders in the form of a circular stitch

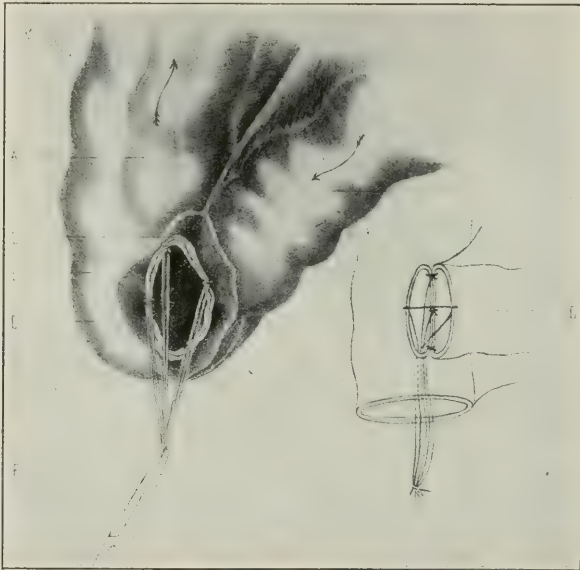


FIG. 3.—End-in-side intestinal implantation by Maunsell's invagination method. *A*, colon; *B*, ileum; *C*, free edge of lateral window in colon; *D*, free edge of end of ileum; *E*, Free, open end of colon; *F*, traction-sutures invaginating free end of ileum and lateral opening of colon through open end of colon; *G*, diagram showing manner of placing traction-sutures.

enclosing all four mesenteric leaves, the tail of the suture being left sufficiently long to tie to the other end on its return. The suture may then be carried rapidly around the aperture of anastomosis, the stitches penetrating one-eighth to three-sixteenths of an inch below the free borders and placed about that distance apart, locked at each thrust by passing the needle under the loop before drawing it home, which should be done under considerable tension.

The final tie leaves a single knot that of necessity lies within the bowel, thus satisfying, for what it is worth, the Connell contention

of the knot within the lumen though the noncapillarity of Pagenstecher thread, which should be used, makes that a matter of minor importance.

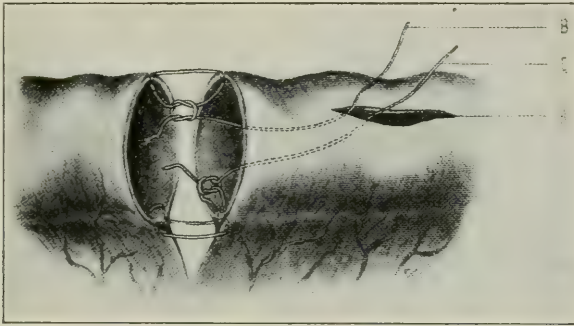


FIG. 4.—Entero-enterostomy by Maunsell's invagination method preparatory to invagination. *A*, window in antimesenteric aspect of intussusciens; *B*, manner of placing the antimesenteric traction-suture; *C*, manner of placing the mesenteric traction suture.

Nothing can exceed the ease, simplicity and rapidity with which the junction of these concentric apertures, whether end to end, end to side, or side to side, is effected, and nothing, also, can surpass the security of such union, the entire strength of each intestinal wall lend-



FIG. 5.—Maunsell's invagination method—with continuous locking suture.

ing its holding qualities, while with the continuous locked suture there is no possibility of a slipping of either edge. Moreover owing to the character of the stitch, if a proper tension is put upon the thread at the tightening of each loop, the tissues are in all probability gradu-

ally strangulated and in the course of a few days necrose and pass away just as the interposed flange between the segments of a Murphy button does, leaving a clear unobstructed lumen. It will further be noted that this suture leaves no unstricted portions of free edges and as a consequence hemostasis is effectual.

After reducing the artificial intussusception the procedure is quickly terminated by closing the window with a row of right-angled Cushing Pagenstecher sutures.

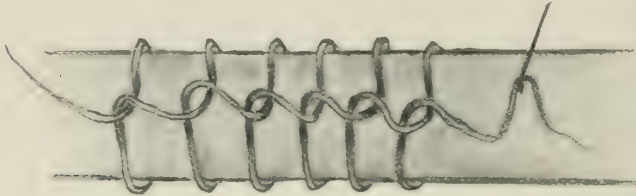


FIG. 6.—Detail of continuous locking suture, loose. Vertical view.—(After Bickham.)

I suspect that the general plan of the Maunsell invagination technic for anastomosis may appear complicated to one who has not tried it and perhaps defective to some who have followed the original and still generally described method of uniting the concentric anastomotic apertures by interrupted stitches, but I am quite confident that any one, with a mind free from established prejudice in favor of another technic, who will attempt the same general method with the substitution of a continuous through and through locked

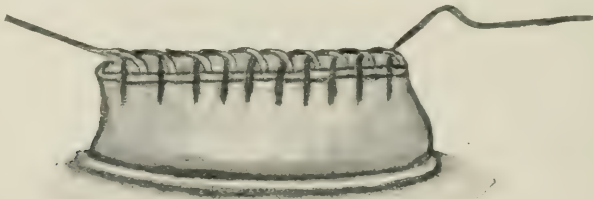


FIG. 7.—Detail of continuous locking suture, loose. Side view.—(After Bickham.)

stitch for the anastomosis will adopt it as the method of choice. The extreme facility for suturing afforded by the exactly related and freely exposed concentric apertures and the unusually secure joint resulting from a single, locked or buttonhole row of sutures make a lasting and favorable impression on the mind of the operator.

The method is as readily adaptable to end to side and lateral approximation as to the end to end anastomosis. A feature not so far mentioned is the facility with which a joint can be effected be-

tween intestinal ends of different caliber; when the two barrels of gut are invaginated, the smaller within the larger, the latter is hugged down and made to nicely fit the former, like the rim of a wheel on the hub, by taking with each stitch a somewhat wider bite on the outer zone than on the inner.

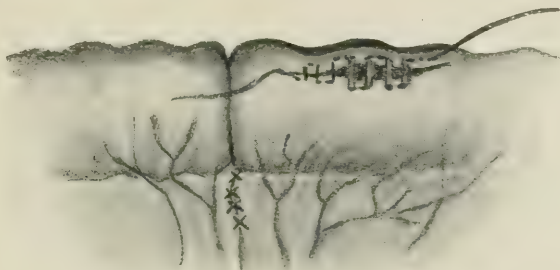


FIG. 8.—Closure of window by cushioning right angle suture.—(After Bickham.)

The anastomosis (after resection) by this, or any other method, will be much facilitated by making absolutely linear cuts across the gut, without any irregularity whatever. The evenness of the resulting edges will greatly aid in making an exact joint. This straight edge may be produced by following, with knife or scissors, the side of a clamp applied to the intended line of excision but as it is desirable not to crush the walls, which are later to enter into the joint, a

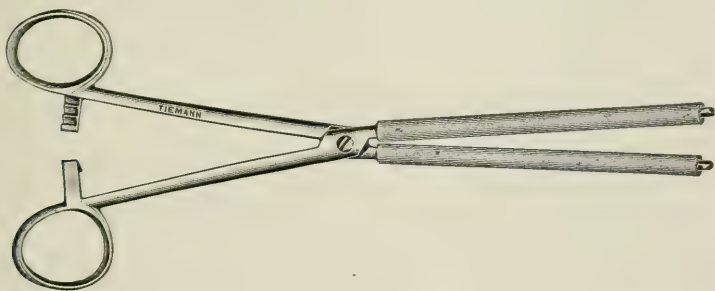


FIG. 9.—Intestinal compressor.

rubber shod clamp after the general style of a hemostat and just strong enough to sufficiently compress the gut walls is a convenience. The set of four presented here, which I have had made for the purpose, have proved more satisfactory than other intestinal compressors. The second pair are applied sufficiently far from the first, proximally and distally, after milking away the fecal contents, to insure empty

segments of intestine for invagination purposes, before removal of the first pair. As you will notice, they are made of sufficient length to pass across not only either small or large intestine but, also, a considerably distended gut.

The writer's experience with this modified Maunsell technic in eight cases during the past two years has been so satisfactory that he has been impelled to offer this little paper in the hope that some—more especially among the younger surgeons—who may read it and who have not already become wedded to another technic, may by a trial discover that this old method with a trifling but effective modification may prove to more nearly than any other meet the necessary requirements.

It is not expected that the proposal to revive a technic so nearly discarded by the profession in general, no matter how modified, will be accepted by a large part of the Fellows present, but a discussion, whether, in criticism or commendation, cannot fail to be profitable.

The accompanying illustrations and models I trust will make clear the difference between the original and the modified Maunsell technic.

62 MADISON AVENUE.

DISCUSSION.

DR. FRANCIS REDER, St. Louis, Missouri.—It is very gratifying to listen to so laudable an expression of an operation that can really be called obsolete, yet the Maunsell operation is a classic, and will always remain so. When we consider intestinal surgery, the choice of technic depends principally upon the predilection and capability of the surgeon. There are two underlying principles in intestinal surgery that have long been appreciated. These principles are simplicity and safety: simplicity in suturing, and safety in the proper coaptation of the peritoneal surfaces long enough to cause good agglutination. I have seen many intestinal anastomoses, and I have, however, only seen one of the Maunsell type. That was performed at my request in Leeds. I have performed it twice myself for the purpose of demonstrating to the interns in the City Hospital of St. Louis its underlying principles. Why is the Maunsell operation not more popular? Simply because the advance in intestinal surgery has supplanted it with simpler methods.

The history of intestinal surgery is exceedingly interesting. It authentically dates back as far as the thirteenth century, and was practised by the four masters. These four masters were monks. Among the early contributors to intestinal surgery I may mention in this connection Albucasis, Guy De Chauliac, Le Dran, Ramdohr and Travers. I may state that the first recorded case of recovery

following circular enterorrhaphy for complete division of the bowel was in 1730 operated by Ramdohr. Later came Astley Cooper, who was really the first to bring about an improvement in the method of suturing. In 1826 Denans made known a device which he introduced into the lumen of the bowel, a principle we find involved in the Murphy button. Others whose interests furthered intestinal surgery were Amussat, Duverger, Palfyn, Jobert, Thomas Smith and Gross.

The question arises, which of the methods we have at our disposal is the simplest and safest? The Maunsell operation is not as easy as a technical description would lead me to believe. We have our difficulties with the mucosa just as we have with the other methods. The method has given us the principle how the knot can be placed within the lumen of the bowel. Connell with his classic stitch has given us convincing proof why a knot placed in the inside of the intestine is prone to be less dangerous than the knot placed outside of the bowel.

Formerly in all axial unions the mesenteric triangle was a great stumbling block. The dangers from this source are almost completely done away with in the Maunsell operation. In the other methods this space is obliterated by the introduction of a Lee mattress suture, a suture very similar in principle to that of Maunsell or Mikulicz. Although some operators use a preliminary or even a terminal stitch, the mattress suture as described by Lee is the accepted one by most surgeons in circular enterorrhaphy. In making the section for an axial union an unsuspected injury to an important blood-vessel may take place. This may prove serious. We need all the vascular supply that is possible in this method of union. It may also behoove the surgeon to sever the mesentery close to the bowel instead of cutting out a triangular piece, so beautifully shown in pictures. The excision of a triangular wedge from the mesentery appears to me to be a dangerous practice.

In an end to end junction it was not an infrequent happening to have a diaphragm at the site of union. This was very objectionable on account of the liability to obstruction. With the Maunsell method such a diaphragm did not exist. It is fairly claimed that with our present methods of suturing such a bowel inversion can be avoided.

The question has been raised in adverse criticism to the additional traumatism in the Maunsell method caused by the incision in the proximal end of the bowel. This is a weak criticism and does not weigh heavy against the method. What weighs against the measure is its complicated technic, now supplanted by simpler methods. If I may express an opinion, I would say that in my service at the City Hospital where I have had occasion to perform intestinal anastomosis for injury or for pathological conditions on a large number of patients, the lateral union, on account of its safety was given the preference. In some cases of injury to the intestinal tract requiring resecting the axial union was made, either with suture or Murphy button; there seemed to be, however, a lack of faith in this method when compared to the lateral unions.

With lateral anastomosis there is no contention with the mesenteric triangle. Injury to the arterial supply is minimized, there is a liberal coaptation of the peritoneal surfaces with no inversion of the edges and the opening for communication between the bowel ends can be made amply large. The results have been invariably good. The only complication that might arise is a leakage that could occur in case the closed ends of the bowel gave way secondarily.

DR. GORDON K. DICKINSON, Jersey City, New Jersey.—I am not going to undertake to go back to the twelfth century in discussing intestinal surgery, but I can go back about thirty-seven years. I have seen a great deal of the technic of intestinal anastomosis. My own feeling in regard to intestinal surgery is that, as Dr. Reder put it, it is the man behind the gun. It is Crile, and only Crile, who can practise anoci-association and get such wonderful results.

With reference to the technic of intestinal anastomosis we must individualize our cases, in order to be successful, and I am glad that Dr. Gray has cut the red tape of conventionality and brought us back to that which is obsolete, but which perhaps is not obsolete after all. Everything dies except simplicity. There is that which is very simple in the Maunsell operation; there is also a great element of safety in it, as evidenced by the doctor's series of cases which he reported.

We have at the present time three types of anastomosis which are really fairly safe, the Maunsell, the Connell and the invagination methods in speaking of lateral anastomosis. The invagination method has a great deal which is attractive, but we are not sure that hemorrhage is not going to take place. We have no running suture to prevent hemorrhage from the margins of the gut that is invaginated. The Connell method is complicated, and the Maunsell has the element of possibly infection into the mesenteric edge. We need a clean, perfect technic when we divide the gut, and this should be done *from* the mesenteric edge, so that the knife does not push the fecal contents. In doing this work I make use of three mattress stitches about the mesentery, introducing one in the middle and one on each side; then I run a continuous suture up to almost the small buttonhole, and stop, and end with a few Lemberts. The circulation in the peripheral portion of the gut is so feeble that you do not need to fear hemorrhage, so I do a combination. I do not have the class of people to deal with that Dr. Reder has in St. Louis, nor do I do as much abdominal work as he does. I would speak against rapidity and fear in connection with this work. We much are very concerned with intestinal anastomosis as we are with Cesarean section, we think we have to do the operation in a short time and we are frightened if we do not do it in time. We must quit all that. If the case is one that needs time, give it. Do not fear that you have to hurry.

DR. ALBERT GOLDSFON, Chicago.—I am rather surprised that no mention has been made of the method published in recent years by Dr. Horsley, of Richmond, Virginia. It is bet-

ter than any method I have ever used. It is better than the Connell, and does not require the Maunsell invagination. It consists of simply a row of stitches through and through, continuous, without the invagination, and the method is extremely satisfactory. I have tried it out on dogs, which is more difficult than in the human. The first knot is wholly within the lumen of the gut and the final one also recedes between the inverted edges. He lays stress upon the pressure effect of the continuous thread from one stitch to the other in arresting hemorrhage.

DR. HUGO O. PANTZER, Indianapolis.—I am delighted with the paper and with the discussion that it has brought out. I do not know that I would commonly resort to the Maunsell operation, but I do resort and trust to a single row of continuous through and through sutures.

As to the treatment of the last stitch, rather than incur delay by the use of McConnel's device, I put an extra Lambert stitch to enforce the possibly weak point which has shown itself sufficient. There is no occasion it would seem to me to employ the lock stitch here advised. I have used the simple throughout-all-layers, over-and-over suture repeatedly, and I have no hesitancy henceforth to use it. An examination six hours after operation will reveal satisfactory peritoneal agglutination, such as will resist the intractable pressure.

DR. GRAY (closing).—I did not anticipate that many of the Fellows would approve of this method off-hand. Every one has a pet notion and a way of doing this sort of work. My chief purpose in presenting it was, in the first place, to present an argument against what is still, I am satisfied, a common practice, using one sort or another of intractable supports, absorbable or non-absorbable. A great deal of that is done yet. I was talking with one of the younger men in New York a few days ago about this and he said, "I have not had the opportunity," although he does a good deal of surgery, "of making many anastomoses, but I use the Murphy button because it is the easiest. He looked this matter here presented over and said, "I am going to throw the Murphy button away."

I am gratified to find that no one has advocated the use of artificial devices in helping to make intestinal anastomosis. One ought to depend upon the needle and thread.

About this particular method of Maunsell, I believe any one who tries it will be impressed with the simplicity of the anastomosis and that is an important thing. If you try it you will see how simply and safely you can get a circular stitch around the mesenteric leaves and whip over the borders with a continuous suture, and I believe it is an additional safeguard to lock each stitch. It does two things: It controls hemostasis better than the continuous suture alone will do, and I believe it so strangulates gradually these tissues enclosed that they come away after a reasonable time just as the flange between the parts of the Murphy button. I may have had luck with it some time, but I have not had so far. Two of my cases

were junctions low down in the large bowel about the end of the sigmoid. In both of them the bowels moved on the table, and each patient had about fifteen to twenty actions of the bowels in the next two days which is a thorough test of the security of the junction. One patient went home in eleven days, and the other in thirteen days.

DELAYED UNION IN NONINFECTED EPIGASTRIC WOUNDS.*

BY

MILES F. PORTER, A. M., M. D., F. A. C. S.,

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HAVING had several cases of delayed union in wounds of the epigastrium in or near the midline without apparent cause, I concluded to investigate the matter. As the result of an extensive search of the literature, there was found but one article bearing directly upon the subject. This article is by Robert T. Morris and was published in the *Journal American Medical Association*, June, 1911. The title of this paper, "The Gastric Weak Line," is very pertinent. O. Madelung has written an exhaustive article on "Postoperative Prolapse of Abdominal Contents,"(1) and gives a detailed report of all cases reported up to 1905; but in this article there is no suggestion that delayed union is peculiarly prone to occur in epigastric wounds. On the contrary, this author asserts that this accident is more likely to occur in wounds below the umbilicus. However, when one stops to think that much of Madelung's material came from an early period in abdominal surgery when the great majority of the so-called abdominal operations were really done for pelvic disease, one is led to disagree with his conclusion. Of Madelung's 156 collected cases, 82 were below the umbilicus. Certainly, in view of the preponderance of the subumbilical incisions that obtained at the time this material was furnished, the conclusion, that lack of union or imperfect union is more apt to occur in wounds below than in wounds above the umbilicus, is not warranted. On the contrary, the figures go to prove that this accident is more likely to occur in wounds *above* the umbilicus. Emil Ries(2) of Chicago, and R. R. Smith(3) of Grand Rapids, have both written on the general subject of separation of abdominal wounds, but both of these authors

* Read at the Annual Meeting of the American Association of Obstetricians and Gynecologists, September 11, 1914, at Buffalo, N. Y.

follow the same lines as does Madelung, with the exception that Ries considers only aseptic wounds which have been closed completely. Many others have reported cases of separation of the abdominal wound, but none so far as I know give any facts of importance not given in the articles referred to. Failing to find satisfactory material in the literature, I wrote a number of letters to surgical friends, asking them to give me their opinions and experiences. In referring to these answers to my inquiries, I shall mention the name of the writer only. Where a name is given without further reference, the reader, therefore, may understand that a personal communication is the source of the information. I wish here to express my appreciation and thanks to the writers of these letters. Of the operators from whom replies were received, fifteen expressed the opinion that midline epigastric incisions were peculiarly prone to delayed union, and five had never observed any difference between wounds above and those below the umbilicus. Abbe says, however, that it is "notorious that incisions in the epigastric region need extra support in suturing." Jonas, also, who has had no experience with delayed union in epigastric wounds, attributes his freedom from this annoyance to the fact that he takes particular care in suturing these wounds and leaves the nonabsorbable stitches *in situ* ten days or longer. Harris says he has had no trouble since he has been using his "longitudinal wire suture." Drs. Oliver and Eastman, of Indianapolis, attributed the trouble they had had from delayed union to catgut and say they have had no trouble of this kind since abandoning its use. Bloodgood also says that in the cases investigated by him "the factor common to all is catgut." Deaver says that he sees no "reason why wounds in any part of the abdomen should not heal satisfactorily in the absence of infection."

While the evidence is not unanimous, yet it is certainly so nearly so as to leave no doubt but that the conclusion is warranted, that epigastric wounds are peculiarly prone to delayed or imperfect union.

In this connection it should be remembered that in a given case, the reparative process may be unusually slow, and yet no ill effects may follow, provided the suture material holds until the union is perfect, and in another case in which the reparative process is equally good, or bad, a hernia or separation of the wound with extrusion of viscera may occur because of absorption of the sutures before the union had been completed.

As to the causes of delayed union in epigastric wounds, it is obvious, of course, that among them will be found those which are common to

all wounds, such as strangulation of the tissues from too tight sutures, infection, undue tension, and systemic debility. However, if it is admitted that epigastric wounds are peculiarly prone to delayed union, then it must follow that there are causes for this peculiarity.

Morris' theory, which is supported by some clinical and experimental evidence, is that "the failure of repair in wounds of the abdominal wall after stomach operations is due to trophic or neurovascular disturbance associated with sensory nerve disturbance in the sensory zone of head."

W. J. Mayo and Willy Meyer are inclined to the opinion that the soiling of these wounds with the gastric or bowel secretions produces a necrosis of the cells and thus delays the union. Certain it is that one is impressed, in reading the reports of cases, with the preponderance of those wherein this soiling was likely to occur because of the fact that either the stomach or the bowel, or both, were opened during the operation.

A. G. Gerster says he has found union in wounds above the umbilicus "tardier in their union in all cases of malnutrition, especially cancer in its progressed stages," but he says further, "back of all there must lie biochemical causes as yet unknown to science."

Brewer also thinks tardy union in epigastric wounds is due to the fact "that so many of these incisions were exploratory for inoperable carcinoma, or for gastrostomy in an esophageal carcinoma." He adds: "Where malignant disease does not exist, I feel that they heal as readily as other wounds."

Powers, of Denver, says that all of his cases occurred "in people far reduced in general health." He reports one fatality following a rapid gastroenterostomy done in a man very far reduced, for a benign lesion. On the eighth and tenth days, when the stitches were removed, the union seemed good, two or three days later the wound fell apart, the small intestine protruded and death followed after quite a period of time from peritonitis.

Meyer, Eastman, Abbe, Lillienthal, Finney and others lay stress on the tension of the abdominal walls due to muscular pull as a cause of nonunion in epigastric wounds. Eastman refers especially to the sudden tension these wounds are subjected to through sneezing and coughing by reason of the close proximity of the diaphragm. The relatively poor blood supply to this region is suggested as a probable cause by Eastman and Crile.

The careful observations of Ries, which are supported by the experience of many observers, leave no doubt but that the delay in

union or lack of union is usually most marked in, and may be entirely confined to, the deeper structures. The skin, however, may share in this tardiness.

In a case of my own, I found one week after a subtotal gastrectomy for cancer practically no attempt at union in either the skin or deeper structures. The silkworm gut stitches were allowed to remain for two weeks, at which time the union seemed perfect.

A. F. Jonas offers as the possible explanation of tardy union of epigastric wounds the fact that the abdominal walls in this situation are, excluding the fat, not so thick as they are below the umbilicus. He adds that the peritoneum is especially delicate, and that the inversion of the skin during the tying of the sutures is especially easy in this situation. These things make perfect coaptation harder to secure here and, moreover, even when it is secured the coapted surfaces are relatively narrow.

Leaving out of consideration the causes which are common to all wounds, we may sum up the causes of delayed union, more or less peculiar to epigastric wounds, as follows:

1. "A trophic or neurovascular disturbance associated with sensory nerve disturbance in the stomach zone of head." (Morris.)
2. Soiling of the wound with stomach or upper bowel contents.
3. Tension of the abdominal walls. This tension is of two kinds: constant from the lateral pull of the abdominal muscles, and intermittent, due to the action of the diaphragm.
4. Lack of blood supply.
5. Thinness of the abdominal walls.

The treatment naturally resolves itself into the preventive and the curative. The former is of much the greater importance, and it is of this branch of the treatment only that I will speak here. We know of nothing which will in any way modify the neurovascular conditions which may interfere with union, aside perhaps from attention to the general condition of the patient. The deleterious effects of soiling the margins of the wound with gastric or intestinal secretions should be avoided by protecting the wound with towels or pads.

By making the incision through one of the recti muscles, instead of through the midline, we may reduce to a minimum the bad effects of tension, anemia, and thinness of the wound margins.

However, as has been pointed out by Ries and demonstrated clinically in many cases, all these precautions may fail in securing prompt and satisfactory union. We should not lose sight of the fact that no matter how much delayed the union is, it is only neces-

sary to keep the parts in apposition until union has been completed, to avoid ulterior results. This means that nonabsorbable, non-irritating suture material should be used and allowed to remain until the operator is satisfied that the union is secure.

It means also that in the after-treatment all reasonable measures should be used to reduce to a minimum the tension both continuous and intermittent. Coughing, vomiting, tympany, movements of the patient, etc., all tend to increase the pull on the suture line, thus inducing separation of the coapted surfaces, even though the sutures hold. It is unnecessary to go into detail but it is well perhaps to mention the fact that these deleterious influences can be materially mitigated by proper selection and giving of the anesthetic, attention to diet, use of the stomach tube and enemas, giving of sedatives and restricting the patient's movements.

In this connection I should like to venture the prophecy that the fashion of getting patients up early, and the early removal of stitches will manifest itself, perhaps largely to our successors, in a harvest of herniæ. Many cases of separation of the wound are reported in the literature wherein the stitches had been removed at the end of a week or ten days and the patient allowed to get up or exert himself in some such way as to bring unusual strain on the parts. In these reported cases the accident was followed by extrusion of the viscera and immediate repair of the injury, but if the separation, starting at the same time and under the same circumstances, should be incomplete and progress gradually the patient will later on come to the surgeon with a hernia. For as has been thoroughly proven by Ries, the separation, when it occurs, always commences in the deeper layers and may be confined to them. An "audible snapping," occurring in the wound during coughing, sneezing, or other exertion (as happened in Ries' case), should lead to a careful examination of the wound and resuturing, if necessary.

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DISCUSSION.

DR. GEORGE VAN AMBER BROWN, Detroit.—I have had three cases in my practice similar to those the doctor has described. The first occurred about ten years ago in a young lady in whom I had re-

moved a large cystic ovary and did the so-called Gilliam operation. She did nicely and left the hospital in fifteen days. Two or three days after she returned to her home I was called and found the wound had separated down to the peritoneum. There was no suppuration. It was filled with one blood clot. A culture was made and staphylococcus infection found. She was returned to the hospital, and the peritoneum was closed with catgut and a layer of gauze placed between the peritoneum and the muscle for drainage, and the muscle sheath closed with catgut, and then she made an uneventful recovery.

The second case was that of a woman, forty years of age, on whom I did a panhysterectomy for carcinoma. She developed a postoperative pneumonia, and the wound opened down to the peritoneum. In that case we were unable to get a growth, and the wound was allowed to heal by granulation, and as she had pneumonia we did not think it safe to give an anesthetic. That was about two years ago.

A third case, which to me was most interesting, occurred in my service at the Providence Hospital about four months ago. This woman had been operated on in another city for cholecystotomy. She could not give the exact time of the operation, but about ten days subsequent to it the wound broke open, peritoneum and all. She was taken back to the operating room, the wound closed, and it healed this time by first intention. She later on in another city had an incision made near the median line and had a gastroenterostomy performed, and a few days later the same thing occurred as happened in the previous operation. I operated upon this woman for a very large fibroid tumor, did a supravaginal amputation, and about the fifth or sixth day following the operation she complained of a stinging sensation in her abdomen. In the evening the house doctor was called, and he thought possibly there was a stitch abscess. We had used catgut in closing layer by layer, and had a tension suture over the gauze of silkworm gut. He removed these sutures and lifted the gauze off, and found there was no evidence of abscess whatever. He simply strapped her up again, and during the night my phone rang and the intern informed me he had again been called up. This stinging sensation had increased to such an extent they called him. He found the intestines out upon the abdomen. In this case there was no culture made. I went to the hospital, had the woman taken up to the operating room, and simply closed the abdomen up again layer by layer. There was no drainage. I used silkworm gut, figure-of-eight, through the sheath of the muscle and through the skin, and she made again the third time an uneventful recovery, and since leaving the hospital I have examined her and find she has an excellent scar.

DR. LEWIS F. SMEAD, Toledo, O.—I want to report two cases of delayed union in right rectus incisions above the umbilicus. The first was a case of pyloric obstruction due to an ulcer in which a Finney pyloroplasty was done. The peritoneum was closed with fine silk. Through-and-through buried stitches of heavy silk, in-

cluding muscle and fascia, were used along with a running silk suture to approximate the fascia. The fascia and muscle stitches were three-quarters of an inch apart and took in about three-quarters of an inch of tissue laterally, and were tied over the running fascial stitch. The skin was closed with a subcutaneous silver wire. At the end of ten days the silver wire was removed, and the wound was apparently clean. In the afternoon the wound was found open from end to end. It was closed immediately but the woman died on the seventeenth day of peritonitis.

DR. ASA B. DAVIS, New York City.—We have seen a number of cases of separation of the wound, probably five or six, although I cannot give the details now. The wound was not infected apparently, and by merely closing it with through-and-through silkworm gut sutures, there was primary and strong union, and no complications. In one or two cases the wound had been infected, opened part of the way down, and had been allowed to heal by granulation. In those cases hernia has developed, while in the others it did not. It is a rare thing for us to have the wound open after a Cesarean section. I do not recall a single one in any of my own cases.

DR. ALBERT GOLDSPOHN, Chicago.—It must be evident to almost all of us that when we try to close epigastric incisions the structures seem to come together with much more tension than lower down. There seems to be a shortage of material here more than in incisions below the umbilicus. My former chief, the lamented Christian Fenger, used to say, "If I made human beings, I would make them more generous in this part of the body." I happen to have had my first and only case that belongs strictly to this discussion. A well-nourished man, who had been having a history of gall-stone trouble for some years back, finally decided to be operated on. He had a number of stones in the gall-bladder, but no infection. It was a clean case, such as I have had no trouble with. These cases all unite except the drainage canal. This man was incised at the middle of the right rectus muscle; I never go through the median line without expecting to have trouble, but when we utilize the right rectus muscle we get a thicker layer of structures to unite and overcome the difficulty alluded to, that these structures are much thinner. We go through the outer aponeurosis of the rectus and through the rectus, or crowd the rectus to one side, and then go through the posterior sheath and into the peritoneum. In this case the peritoneum and posterior sheath of the rectus were together united by continuous catgut in one seam which held. The anterior layer was brought together with great difficulty and united by two continuous rows of catgut that had been hardened in formalin and boiled in water. The fat and skin were united by silkworm gut interrupted sutures that caught into the previous layer, so that there could not be any dead space formed. That man had an uncommon amount of gas or distention during the next week, but no temperature. There was no evidence of any trouble whatever. We had no idea there was going to be anything wrong with the wound until the interrupted silkworm gut

sutures were removed after holding the outer parts of the wound together two weeks, then all at once the whole thing slid apart. There was not a drop of pus. There was drainage of bile through the tube at the upper end of the incision. When I make such an incision as I have described, and close it in the manner mentioned I expect primary union every time.

I am pleased to have this matter discussed here. The bottom of the wound consisted then of the first layer of sutures which took in the peritoneum, transversalis fascia, and probably some of the muscles attached to the posterior sheath of the rectus, not a thick layer, and the wound separated a distance of two inches. I have never seen anything like that before. By this time his gaseous distention had been overcome. In narcosis I put in tension sutures, such as I have been in the habit of putting in in cases of amputation of the breast when the skin does not come together. I put these tension sutures over gauze buttons, the buttons being an inch and a half from the edge of the wound to relieve tension and to give the coaptation sutures a better chance to hold. Years ago I devised these buttons for use in cases of large ventral hernia. I brought the parts together with tension sutures of wire, in the form of mattress sutures with gauze buttons, to transfer tension from the median line to the lateral portions of the abdomen. These tension sutures were in for more than three weeks. This man had them in for two weeks. I brought the receded portions of the recti muscles near each other. In the bottom of the wound the aponeurosis in front of the rectus muscle was necrotic. It was not the fault of the catgut, that held long enough, but the tissues became necrotic on account of excessive tension. So after bringing these things near each other for a week, I cocaineized the parts and made a union under local anesthesia. He has now drainage chiefly from a rope of silkworm gut running from the top to the bottom through, and we hope we will get union.

DR. HUGO O. PANTZER, Indianapolis.—I see the propriety on general grounds of limiting this discussion to the domain especially designated in the paper. On the other hand we may recognize that besides a local there may be a systemic causation and to include here the latter would seem apropos. I make this point on the basis of my second case where the patient was operated at a relatively well period in the course of a pernicious anemia. In this case rupture occurred three days after the operation and no vestige of suture material was found. All absorbable suture material including chromic gut of heavy type had vanished. The patient died of pernicious anemia a few years later. I had seen her one day, when the face and body showed normal proportions. The next day she was bloated from head to foot, looking like little else than a bag of water, so suddenly had supervened a dissolution by her fundamental disease. I cannot but think of this cause as having been active in producing the failure of union and the solution of the suture material upon the former occasion.

The cases of Dr. Davis are healthful women, who under the in-

fluence of pregnancy add to the vitality, *i.e.*, nutrition of the abdominal wall. Dr. Davis informs us that he has seen this accident only four or five times, then, in two cases associated with infection. The cases commonly operated by an epigastric incision pertain to individuals much reduced in their vitality. We may even assume the prevalence of an intensified waste in the immediate locality of the fundamental disease.

DR. FRANK D. GRAY, Jersey City.—The only case of separation of the abdominal wall wound which I can remember in the course of five years or more was one in which a laparotomy was done for resection of the intestine following a bullet wound, the bullet making six or seven apertures in the intestine—which I resected and subsequently united according to the method I described yesterday. The man made an uninterrupted recovery for a week; there was no evidence of sepsis, and at the end of a week he sat up. He was put in a roller chair and on his own responsibility went rolling around the ward. He went back to bed, had partial syncope and vomited. The wound separated. It was closed again, and he made an uneventful recovery with perfect union.

We ought to take the precaution in all abdominal incisions of closing the anterior sheath of the rectus by slowly absorbable sutures, not nonabsorbable, but twenty-day chromic catgut. If we do that, we will have these wounds holding long enough to give satisfactory union.

DR. WILLIAM H. HUMISTON, Cleveland, Ohio.—This discussion is interesting, confined as it is to incisions above the umbilicus. I do not see why we should have more difficulty in this region than in the region below the umbilicus. However, from the reports Dr. Porter received, nonunion occurs frequently. I believe the technic may be at fault in the great majority of cases. It is better to go through the muscle to the right of the median line and be very careful indeed not to strip up the fascia from the muscle. If you make a clean incision, separate the muscles carefully, and divide the posterior fascia carefully, I do not think union should fail to occur. In the majority of cases where the muscle is sutured, the sutures are drawn too tightly. If you use absolutely aseptic chromicized catgut and do not produce tension by the sutures, the healing should be uninterrupted. I have not yet had any such results as have been detailed here to-day. However, I have seen cases in which I thought the trouble arose from the sutures being too tightly drawn. The apposition should be gentle, and if the patient has fair resisting powers, I do not see why we should have any more trouble from an incision made above the umbilicus than one below it.

DR. PORTER (closing).—I was exactly in the same fix as Dr. Humiston, in that I did not see why we should have this accident, but the fact is we do have trouble, and I wanted to find out why we had it. There is no question but that there is a greater lack of union in a given wound above the umbilicus than in one below it. We have succeeded in substantiating the fact that there are several items to be considered in connection with it and which may be said to be

the cause of this delayed union. Relative anemia and increased tension are causes, and another factor that is prominent to any one who carefully studies all these reported cases is that a large number of individuals operated in this region are in a very poor physical condition. They may have inoperable carcinoma or are extremely anemic from prolonged illness with gastric ulcer, and so forth. But when we come to think of all these different causes at work, here is the important thing it seems to me: There are none of them that we can do very much to rid ourselves of. By going through the muscle instead of the midline we get as much blood supply and as broad apposition as we can. We reduce to the minimum the excess tension by cutting through instead of between the muscle. Then we should put in a stitch that will not absorb, but will hold until union is perfect, no matter how much delayed. By doing all these things we have accomplished all we can do except one, and that is, when will the profession ever learn that it takes more than a week for a belly wound to get sound. It takes as long for the deep fascia of the abdomen to become perfectly united and sound as fascia as it does for the radius to become proficient as a radius. Every one of these cases almost without exception gives you the same story. They are allowed to get up in four or five or six days, and it is said the patients were all right, but the judgment of the surgeon was all wrong. No fascia unites and becomes fascia at the end of ten days any more than the radius does. I am not talking theory, I am talking absolutely proven facts; it takes the ordinary deep connective tissue to become mature, after it is divided, as long as it does bone. The moral is simply this: If you must get patients up for a good reason, namely, because they are old or there is more danger of pneumonia than of hernia, all right, get them up, but do not get them up with nothing to support their bellies but catgut sutures. You can use any method of suturing you please, but if you forget everything else and rely on suture material you will have some trouble. Madelung's paper proves how in these cases the wound separates now and again, no matter what method of wound closure is used, but as long as you keep the wound in apposition, while the delay is evident, you will avoid the ulterior result, and that, after all, is all you are after.

The point in regard to the tightness of the sutures is well taken. We all know, that one of Madelung's cases separated, and when he looked at it the whole suture line, including the fascia, muscle, and everything lay loose in the wound. When the sutures are tied too tightly they produce ischemia and drop out. All operators are liable to have this accident and the cardinal point to remember is, that you cannot get a man or a woman out of bed under ordinary circumstances a week after the abdomen has been opened without taking an unwarranted chance with human life. The wound has not healed. The sutures may hold, but the wound has not healed. There are many cases reported in which the sutures were removed at the end of a week or ten days. All right, if you are sure a belly wound has healed, but it is all wrong, if you are not sure.

DR. ROBERT T. MORRIS, New York City.—I came in rather late and did not hear all of Dr. Porter's paper. I would like to ask him whether the nerve supply of the zone of Head was considered in connection with this question. It seems to me that is the crux of the whole situation.

DR. PORTER.—Yes, I referred to your paper, and also to the fact that it is the only article bearing on this line of thought upon this subject that I could find in the literature, either domestic or foreign, until I wrote my own.

RUPTURED GASTRIC AND DUODENAL ULCER.*

BY

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AFTER reading the papers of Dr. Ellsworth Eliot, Jr., in the *American Journal of Surgery* for October, November and December, 1908, and January, 1909, and that of Dr. John B. Deaver, in the *Annals of Surgery* for May, 1913, this subject would appear to be exhausted; but the progress in abdominal surgery during the past year has been so great, especially in the field of diagnosis, that it has prompted me to write this paper on a subject so ably presented by the above men. During the past six years, the advance in this field of endeavor has made far greater strides than in the interim between Dr. Weir's Presidential Address before the American Surgical Association, in 1900, and the publication of Dr. Eliot's paper in 1908.

From the very beginning of abdominal surgery, the subject of the diagnosis and treatment of ruptured gastric and duodenal ulcer has been second only in importance to that of appendicitis. That it is a much more frequent complication of ulcer of the stomach and duodenum than at first supposed, is now conceded by all abdominal surgeons. As our methods of diagnosis, clinical and otherwise, become more perfected, cases of general peritonitis, the so-called "idiopathic" peritonitis (or peritonitis of unknown origin) can, in quite a number of cases, be traced back to the stomach or duodenum as the source of the lesion. Though there have appeared in the literature during the past few years quite a few articles on this subject, the last word is yet to be written and much is still to be learned before the subject will be as clear and as well understood as that of appen-

* Read at the Annual Meeting of the American Association of Obstetricians and Gynecologists, Buffalo, September, 1914.

dicitis. Like appendicitis, this is true more particularly of the general practitioner and the internist than of the abdominal surgeon.

The important symptoms, while varying somewhat in the different cases, yet when studied carefully are found to run along somewhat similar lines. The history of a typical case might be epitomized as follows: A young person, generally a male, between the ages of twenty and forty years, apparently in good health, is suddenly seized with a severe stabbing pain in the right hypochondriac region and rapidly goes into a condition of profound shock, with subnormal temperature, rapid pulse, sighing respirations, pale mucous membranes, moist and flabby skin, cyanotic in appearance, sunken eyes, drawn face, contracted muscles, legs possibly drawn up on the abdomen, heart sounds feeble, perhaps a severe pain secondarily in the right iliac fossa, muscles of the abdomen drawn tense, abdomen retracted, with board-like sensation, generally some nausea and vomiting and vomitus may or may not contain blood. Several hours after the onset of the attack the abdomen becomes distended, with all the evidences of a general peritonitis.

If now we obtain a careful clinical history, we learn that the patient has been treated for several years past for chronic indigestion or dyspepsia or possibly, in rare cases, for gastric or duodenal ulcer which had apparently been cured.

We find, from careful analysis of the symptoms, that acute pain is the earliest, most constant and most prominent of them all. This pain is sharp, lancinating in character, and localized in the right hypochondriac region. Secondarily, there may be severe pain in the region of the appendix. The original pain may or may not extend up under the left shoulder blade.

Next in importance to pain is tenderness, which is marked and lies over the site of the perforation. However, as the peritonitis increases, this tenderness becomes more diffuse and finally is general over the abdomen.

Following tenderness is shock, apparently out of all proportion to the lesion, and in no other condition, except in ruptured ectopic gestation, have I seen such marked shock. This profound shock is due, I believe, to some interference with the solar plexus, and we have a condition somewhat similar to that produced by a hard blow over that region.

The pulse at first is apt to be slow and full, but within a few hours after the perforation its rate rapidly increases, soon becoming thready, and almost imperceptible at the wrist. Temperature at first subnormal, in one of my cases going down to 96° F., then gradu-

ally rising in keeping with the pulse. In none of my cases did I have an opportunity to take the blood pressure, no doubt a wise step which would, I am sure, show a lowered resistance. The blood, of course, shows a high leukocyte count, as would be found in any infection.

Nausea when present occurs in the first few hours after the perforation and rarely persists for a longer period than three or four hours, when it ceases, only to return when general peritonitis has set in, when we get the fecal vomiting preceding dissolution. Constipation is absolute from the beginning.

Diagnosis is fairly simple if we are able to obtain a complete clinical history. In this history the point to be brought out is that the patient has suffered for years with digestive disturbance. This is our first and most important diagnostic point. The second is the sudden attack of pain, with tenderness over the right hypochondriac region, with secondary involvement of the region over the appendix, and profound shock.

We now come to the most interesting and at the same time the most important step, the differential diagnosis. The first condition which may be confused with perforation is that of an acute gangrenous appendicitis, because of the pain very quickly shifting to the appendicular region, due to the fact that the free fluid in the abdominal cavity rapidly gravitates to the right iliac fossa. Here differentiation is based mainly on the clinical history, the location of the pain in the beginning, and the severity of the shock. In appendicitis, constipation is an important factor and the pain never extends up under the shoulder blades. These last two points should promptly exclude appendicular trouble.

Ruptured gangrenous gall-bladder has occasionally been mistaken for this condition. Here again the clinical history is essential; for in the majority of cases we are able to observe that the patient generally presents a picture of deep jaundice, and the pain always extends to the right shoulder blade.

Occasionally a stone in the right kidney, which has taken upon itself to migrate toward the bladder, might be mistaken for a perforation, but careful examination of the urine showing the presence of pus and blood cells, the primary site of the pain in the right lumbar region and referred along the course of the uterus into the pelvis, enables us to differentiate.

Also a twisted ovarian cyst on the right side may be confounded. However, if we obtain a history of painful and irregular menstruation, with pain less acute, with primary lesion in the right iliac and

hypogastric regions, secondarily in the right hypochondriac region, and in contradistinction to the primary and secondary pain in perforation, we are assured that the condition is an ovarian one. In perforation of the bowel, we have more diffuse pain over the abdomen, the other symptoms being the same. In ileocecal intussusception, as a rule, we have the presence of the sausage-shaped tumor which can be readily palpated, as well as the bloody stools.

There have been reported a few cases wherein a condition of ruptured extrauterine pregnancy had been mistaken for that of ruptured gastric or duodenal ulcer, but the symptoms in the former are so definite that these conditions should not be confused.

Within the past four years there have entered my service at the Albany Hospital five cases of ruptured gastric and duodenal ulcer. Four of these cases were operated upon within four hours after the rupture, three surviving. The fifth case was operated upon thirty-six hours after rupture and survived barely long enough to be returned to his room.

CASE I.—C. G., aged twenty-four, born in United States, electrician, referred by Dr. James F. Rooney. Family history, negative. Personal history, negative. Past history: For a year patient complained of mild attacks of indigestion. Would "belch up" gas, and appetite impaired; experiences a sense of hunger at short intervals and would eat a little at such times. These symptoms disappeared, and not until September 13, 1910, did he complain again. He said that he had pain in the "pit of his stomach," about meal hours. With this came a sense of hunger, which proved to be a false appetite, as he was able to partake of but very little food. This condition prevailed until September 22. On that day about 7.30 P. M., he rose from his chair, when suddenly he experienced severe "cramps in his stomach." He was very dizzy, pain in the abdomen continued with nausea and later vomiting. His condition grew worse as time passed. At nine o'clock he was seen by Dr. Rooney, who advised him to go to the hospital for immediate operation.

Patient entered the hospital at 11.30 P. M. and immediately operated upon. At the operation a perforated gastric ulcer was found at the pyloric end of the stomach just alongside the sphincter. The perforation, which was the size of a pea, was closed with interrupted Lembert sutures. Wound closed with cigarette and rubber drainage. Stab wound in the right iliac fossa, and drained in the same way. Considerable fluid had collected at this point. Cigarette drain removed at the end of forty-eight hours; rubber tube allowed to remain for a week. Patient left the hospital at the end of three weeks and, when last heard from (a year ago) was still well.

CASE II.—P. M., aged forty-six, born in England, newsdealer, referred by Dr. Baxter T. Smelzer. Family history, negative. Personal history, negative. Past history: Practically the same as Case No. I. Has had "stomach trouble" for twenty years. While

finishing a hearty supper he was seized with an excruciating pain in the region of his stomach, his condition bordering on collapse. Patient was at once seen by Dr. Smelzer, who called me immediately in consultation. Operation was advised and accepted. Conditions found were similar to Case No. I. Patient made a good recovery and has been well ever since.

CASE III.—S. M., aged thirty-six, born in United States, traveling salesman. Referred by Dr. L. E. Blair. Family history, negative. Personal history: Heavy drinker and smoker. Past history: For ten years, up to five years ago, he had complained of more or less indigestion, with eructations of gas, and all the symptoms of chronic indigestion. The last five years he had been exceedingly well. While seated in a barber's chair, three hours after partaking of a heavy meal, he was suddenly seized with severe pain in the "pit of his stomach." The symptoms indicated perforated ulcer and he was ordered to the hospital. Owing to his wife's absence the operation was delayed four hours.

A perforation of a duodenal ulcer, about $\frac{1}{8}$ inch in diameter, was found. There was considerable free fluid in the abdominal cavity. Patient did well for several days, when he suddenly developed general peritonitis, went into collapse and died within twelve hours. Autopsy not allowed.

CASE IV.—G. A., aged nineteen, born in United States. Laborer. Family history, negative. Personal history, negative. Past history: Had been troubled with more or less "biliousness," all his life. After eating a hearty meal he was suddenly seized with pain in the epigastric region which compelled him to go to bed. He was treated with home-remedies for twenty-four hours. Forty-eight hours after the attack patient was seen by me. Diagnosis: General peritonitis due, either, to a gangrenous appendix or a ruptured gastric- or duodenal ulcer. As a secondary incision was necessary in the appendicular region, the primary incision was made in the right iliac fossa. This was found filled with fluid. The appendix, while somewhat inflamed, was, evidently, not the seat of the trouble. An incision in the right semilunaris, over the duodenum, revealed two perforated gastric ulcers. Usual operation. The patient behaved very poorly while on the table. The operation was, therefore, somewhat hurried. Patient died within two hours.

CASE V.—W. S., aged twenty-eight, born in United States, fireman. Family history, negative. Personal history: Indulges in alcoholic beverages. Past history: a year ago, patient fell down stairs and fractured right knee-cap. Did not complain of any stomach trouble at that time. While seated at the supper table he was seized with a pain in the right hypochondriac region, followed by collapse. Pulse and temperature normal. Reached hospital two hours after seizure. Operation revealed small perforation of the duodenum with very little leakage of the intestinal contents. Usual operation. Patient made an uneventful recovery.

We notice in these histories that the patients were all comparatively young men, who had for years complained, more or less, of

chronic indigestion; but of which they had seemingly recovered. While apparently in the best of health, they were suddenly seized with a severe pain in the epigastric or the right hypochondriac region, and presenting at once all the symptoms of profound shock. The severe pain in the epigastric region was quickly followed by a secondary pain in the right iliac region, together with rigidity and dullness on percussion all along the right side of the abdomen. All of these symptoms occurred very rapidly after the perforation. The perforation came on without premonition. In all of the cases the patient were, apparently, enjoying better health than usual when the perforation occurred.

So far as the treatment is concerned, there is but one thing to do: operate as soon as the diagnosis is made. I prefer a free incision in the right semilunaris. This admits of ready inspection of the entire right side of the abdominal cavity. Experience has shown that the majority of perforations has occurred at the pyloric end of the stomach or the first portion of the duodenum, and this incision gives us an exposure of the field and plenty of room to work. The perforation having been located, it may be closed in one of several ways: A couple of continuous Lembert sutures are amply sufficient and they are quickly introduced. If possible, the sutures should be inserted parallel to the long axis of the stomach or duodenum, so as to interfere as little as possible with the circumference of the gut when the scar contracts.

As a rule, the condition of the patient will not permit a gastro-enterostomy, as some advise. If this operation is necessary it can be done subsequently when the patient's condition is improved. Rubber, or a cigarette-drain, should be placed in the lower angle of the wound, down to the point of perforation. A second incision should be made in the right iliac fossa, and drainage inserted.

A paper of this sort should be presented to an assembly of physicians and surgeons, rather than surgeons only, as the surgical treatment of the condition is pretty well fixed. It is for the general practitioner, who is first called in to see the case, to make the diagnosis and to suggest the treatment. He should understand that an operation, not expectant treatment, is indicated.

DISCUSSION.

DR. JOHN F. ERDMANN, New York.—This is an exceedingly interesting subject. As to the question of perforating duodenal ulcers, I have reported and presented six patients this year to the Surgical Society of New York up to the seventeenth day of March. I would like to take exception to what Dr. Vander Veer has said

in regard to the treatment at the present time. In the first seven or eight cases I had, I excised the perforation with the surrounding induration, and sewed the freshened edges together as though I had done an enterostomy or gastrostomy. In addition gastroenterostomy was done. Gastroenterostomy can be performed within five or twelve minutes without any trouble. If you take a case of perforation from duodenal ulcer and operate on it in the first twelve hours, with or without clamps, the question of defiling the peritoneum is not one of great moment. You are not doing the patient any harm, but a great deal of good, in that you eliminate the factor of a second operation.

With reference to the symptomatology, we should take a careful anamnesis of all abdominal conditions. We will find in the majority of cases of duodenal and many pyloric ulcers the syndrome described by Moynihan evident; this symptom is pain preceding the expected meal, easier or abolished by taking some food or alkalies, that is, at four or five o'clock in the morning preceding breakfast, or at eleven o'clock in the morning preceding luncheon, or at six o'clock in the evening preceding dinner, there will be a characteristic pain. This was well shown in a patient, fifty years of age, who, when sitting at his desk, was seized with excruciating pain in the abdomen, was carried to a sanitarium and a diagnosis was made of acute perforative appendicitis. When I saw him in consultation I said, "This is not appendicitis, he is suffering too much pain for the trouble to be appendicular, let us take the history." The first item of information the patient volunteered was that at about eleven o'clock in the morning, preceding luncheon, he would have pain, and after taking his luncheon relief would follow. Again, at six o'clock in the evening, for several months, just preceding dinner, pain would come on, which would be relieved by dinner. He would suddenly awaken between four and five o'clock in the morning, with pain. I tie my diagnosis as tightly to this symptom as Moynihan does—the pre-expectancy meal pain with relief in taking food. While I was connected with the Gouverneur Hospital in my earlier years, ten years ago I operated on thirteen cases of perforating ulcer in which infolding of the peritoneum, etc., was carried out without gastroenterostomy. I do not believe infolding of the peritoneum is curative in cases of duodenal ulcer in the face of the induration we have, and I have never seen a case in which the ulcer was not markedly indurated, but the infolding produces a cure for the perforation only. I believe in the majority of duodenal cases we can excise the induration without difficulty or we can do a simple excision while doing the pyloroplasty of Finney, or do an excision, sewing up the freshened edges and doing a gastroenterostomy subsequent to it as stated by me before.

In regard to drainage, I resort to it for the first twelve hours. After the abdomen is washed out I sew up the wound tightly, in a few instances. When drainage is needed, I prefer a cigarette drain which is kept in, say for forty-eight hours. In these cases I do not hesitate to remove the appendix. I believe with others that the appendix

has been a marked associated cause of the onset of this disease in many instances and therefore should be removed.

DR. ROBERT T. MORRIS, New York City.—I would take exception to the idea that we must always stop to suture in these cases. What are we going to do with a patient who is in collapse? I am not talking about the patient who is able to discuss the next governorship of New York or talk about the war, when you go to see him. I am talking about the patient who does not know whether you are in the room or not. To illustrate my point, I will make a schematic drawing on the blackboard. We will call this the stomach, and this the duodenum. Let us say we have a perforation at this point (indicating), and we will call this the abdominal wall. Let us suppose the patient is in collapse. The thing to do is to make an opening quicker than lightning with a pair of scissors, and hear the gas whistle. If I cannot see the perforation I can at least see where the whistle is coming from. If I can get a tube in there, a split tube, and leave it right there, I can take another split tube with a strip of gauze and put it alongside. I do not stop to look for the perforation. There may be cucumber, and there may be cheese, loose in the peritoneal cavity and you will find the patient can take care of them pretty well. I have had three patients who got well after that treatment. Knock down the peristalsis with opium. Overlook the cucumber and cheese, and they will come out through that hole in less than three days. (Laughter.)

DR. MILES F. PORTER, Fort Wayne, Indiana.—There is possible danger in emphasizing the question of correct pathologic diagnosis in this and similar conditions, when you bring a message especially for the general practitioner. Let us not forget the fact that our patient comes to us, not for the purpose of an exact pathologic diagnosis, but to be cured, and every operator in this room of large experience can refer to cases by the dozen that have died while they have been waiting for a correct diagnosis, either at the hands of the general practitioner or less often at the hands of the surgeon. What different does it make whether the patient has a gastric ulcer, a duodenal ulcer, an inflamed appendix, a perforated typhoid ulcer, or a ruptured tube? I say, practically, what difference does it make? He wants his belly opened, he wants it done quickly and wants to get well. Therefore, I say, there is a possible danger in harping on this question of diagnosis. The fact of the business is, when we have come to a decision and have opened the belly, we find we are wrong. If you have a working diagnosis, and know the belly ought to be opened, open it, and do what is proper so that the patient can get well.

DR. BUDD VAN SWERINGEN, Fort Wayne, Indiana.—I want to give a reason for doing more than the immediate needs in an operation of this kind by the recital of a case. I saw a man at a farm house who had perforated gastric ulcer. The belly was opened. He was in extremis. Perforation had occurred fifteen hours before I saw him, so that nothing was done, except to close the ulcer and provide drainage. The subsequent history of the patient was ex-

tremely satisfactory for a week, when he suddenly had a violent gastric hemorrhage and expired.

I merely recite this case as a reason for extended work if it is possible to do it. I think if this ulcer had been excised, or if there had been a gastroenterostomy done, the patient might have escaped death from hemorrhage.

DR. CHARLES W. MOOTS, Toledo.—This is an interesting subject to me because of a case that happened in my own family. A diagnosis was made of perforated duodenal ulcer in the case of my wife, and in two hours Dr. Jacobson opened her and did what Dr. Morris said he did. He felt she would get well. He went to Europe. She got over the attack, and three or four months later Dr. Smith did a gastroenterostomy, and she is living and has been quite healthy since.

DR. THOMAS B. NOBLE, Indianapolis.—I am somewhat carried away by the striking position taken by Dr. Morris. I am profoundly impressed by the remarks he has made relative to his disposition of the pie and the cucumbers and the cheese in the upper abdomen, but what is he going to do with the pickled pig's feet that may exist in the pelvis? I have had this experience and have found these articles in the upper abdomen and the pickled pig's feet in the pelvis which, I believe, if I had allowed to remain, would have carried this man to the golden paved streets of the new Jerusalem, but instead of that he got well by opening the abdomen thoroughly and cleaning it out. Here comes in a question: I have a success in which, after cleaning out the bowels, cleaning out the stomach, cleaning out the intestine by stripping it and by thoroughly evacuating the abdominal cavity of its contents with gallons of salt water, my patient recovered. Which of these cases shall we treat according to the method of Dr. Morris, and which shall we treat according to the way I have just described? Therein lies the question. You will be damned if you do it in some of these cases, and damned if you don't do it in others, so it is largely a question of surgical judgment in the individual case. We cannot follow any rule. In some of these cases it is better to do a two- or three-minute operation, and in still others we had better be thorough and do a complete operation. We cannot take a dogmatic position and lay down rules relative to this class of cases, but we all need to know about the pathology and sequence in connection with these cases.

DR. MORRIS.—I did not make any dogmatic assertion. I agree with Dr. Noble that it is a question of surgical judgment.

DR. FRANK D. GRAY, Jersey City, New Jersey.—The most practical point made in this discussion is by Dr. Porter, that it is unwise to wait for an accurate diagnosis, and yet I would say you must make a *diagnosis*, but that diagnosis must be an acute abdomen. If your diagnosis is one of acute abdomen you are justified in doing a laparotomy and accomplishing whatever is necessary when you get in. If it is a chronic abdomen, you can afford to wait and make a differential diagnosis.

BILIARY SURGERY.*

BY

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THE greater portion of this paper was read before the New York Surgical Society, April 22, 1914. I have felt that an additional consideration of the questions of two-step operative procedure, etc., with a brief reference to the x-ray diagnosis, would be of value.

During the period of time covered by this paper—from January, 1910 to April 10, 1914—270 patients were operated upon, with 13 deaths—a mortality of 4 plus per cent. The majority of these patients were subjected to operative interference upon more viscera than the gall-bladder alone, or the gall-bladder and duct were interfered with, thereby insuring a greater risk as to mortality than individual operations would give. It is with a view of presenting the causes of death and the operations done that I offer this paper.

Age.—This varied from twenty-two to seventy-four years.

Sex.—The number of patients in whom the sex is recorded is 242; of these, 154 were females and 88 were males—rather a sharp contrast to the records of Whittemore of Boston, published in the *Boston Medical and Surgical Journal*, October, 1913. He reported a series of 595 cases in which there were 441 woman and 154 men; almost three times as many females as males.

Type of Disease.—My records show 54 cases of acute cholecystitis; 34 cases of gangrenous cholecystitis, and 115 cases of cholecystitis not otherwise classified; this series included all varieties, from noninflammatory to hydrops. There were 6 cases of perforated cholecystitis; 6 noncalculous; 4 malignant; 8 hydrops and 23 cholangitis cases. In addition, acute hemorrhagic pancreatitis, with suppuration or sloughing, was observed six times.

The operations recorded were as follows: Cholecystostomy, 125 cases, with 5 deaths. Cholecystectomy, 96 cases, with 4 deaths. Choledochotomy and transduodenal choledochotomy, 5 cases in all, with 2 deaths. Cholecystostomy with choledochotomy, 27 cases, with 1 death. Cholecystotomy, with and without combined operations upon the duct, 142 cases, with 6 deaths. Cholecystectomy,

* Read before the American Association of Obstetricians and Gynecologists at Buffalo, New York, Sept. 15-17, 1914.

with and without combined operations upon the ducts, 123 cases, with 5 deaths.

Here it will be well to note the relative mortality rates in these two types of operation as a prognostic factor in advising their performance. In the so-called lesser mortality type of operation, cholecystostomy, with and without combined operations upon the ducts, I report 142 cases, with 6 deaths—a mortality of 4.2 per cent., while in the graver operation of cholecystectomy, with and without combined operations upon the ducts, I report 123 cases, with 5 deaths, a mortality of 4 plus per cent. Attention is also called to the difference in the results after cholecystostomy alone, 125 cases, with 5 deaths, and after cholecystectomy alone, 96 cases with 4 deaths. In both the mortality was about 4 per cent.

Choledochostomy, singly or combined with operations upon the bladder, was done in 49 cases, with 4 deaths, about 8 per cent. If the choledochostomies, without additional bladder operations, be considered, the mortality in this series is exceptionally high—5 choledochostomies of this class being done with a mortality of 2, or 40 per cent. These two deaths are easily explained: one occurred on the fourth day from embolism, and the other was due to a compression—interstitial fibrosis—of the liver cells in a patient 65 years old, in whom I opened the common duct, with negative findings, four years after a primary cholecystectomy and choledochotomy for pronounced cholangitis. Added to the cellular change in the liver in this case, was a marked nephritis, which was the final cause of her dissolution, as there was almost complete anuria for four days preceding her death.

Secondary Operations.—Under this term I include those patients who were operated on a second or a third time—not those considered as two-stage operations. I can find the histories of but eight such cases in a series of 270, and these I will mention briefly. All were operated on by surgeons of repute, and I have no reason to doubt that the operations were as complete and thorough as the circumstances permitted. The following case presents a point of interest as to the length of time necessary for stones to grow to some size:

Mrs. B was operated on six years ago in one of our large hospitals, a cholecystostomy being done. She remained free from pain for about two years, then all her former symptoms recurred with increased severity, and there were signs of duct involvement. I then operated on her, exposing a very long, adherent gall-bladder, containing thirty-three stones, none of them smaller than a marrow-fat pea. Four stones about the same size were also found in the com-

mon duct. A cholecystectomy and choledochotomy were done, together with the removal of the appendix. The patient made a prompt recovery, with no recurrence of any kind up to the present time.

It is but fair to the operating surgeon in this case to assume that in a case of election, as this was, we can preclude the possibility of his leaving thirty-three large stones in the gall-bladder. Therefore, either these stones were conveyed as fairly sized ones from the liver into the bladder, or else the growth of stones in the gall-bladder can be very rapid. The common duct invasion must be considered by itself, as this part of the hepatic system was not operated upon at that time. We are all aware of the presence of hepatic stones, and in view of this established fact, I advance the above argument as to the possible migration from the liver to the gall-bladder.

The second patient in the series was a young woman who was operated on a year ago for an acute gangrenous (?) cholecystitis. No stone was found at the time. She came to me with a persisting fistula, and upon exposing her gall-bladder, a stone the size of a robin's egg was found. This stone, I am quite sure, was overlooked at the first operation. A cure was established in two weeks by doing a cholecystectomy.

The third patient was a physician in whom a cholecystostomy was done hurriedly two years ago in the Presbyterian Hospital, for a suppurative condition, and owing to profuse hemorrhage from the surrounding tissues, packing was resorted to. Two years later he again developed marked symptoms—with great difficulty I was able to do a successful cholecystectomy with appendectomy.

The fourth case was one of my own. The patient was a female, twenty-two years old, with an acute hemorrhagic pancreatitis. In addition to establishing very liberal drainage, I did a cholecystostomy, removing many stones, some of them the size of a marrow-fat pea. Speedy recovery took place, the drainage wound healing promptly. Only recently, about three years later, I was compelled to explore her for abdominal pains similar to those she had had before her first operation, with the result of finding an atrophied and contracted gall-bladder containing muco-pus and an amber-colored stone, entirely different from those originally removed, and about the size of a very large marrow-fat pea, impacted in the cystic duct. A cholecystectomy and appendectomy were done, and speedy recovery followed.

The fifth patient was one in whom a rapid cholecystostomy was

done twenty months ago in one of our large hospitals by a man of very extensive experience. When I saw the patient, she said she had had a period of eleven months freedom, and then all her symptoms of a stone in the duct recurred. At this time the patient had a temperature of 103.6° F. and was profoundly jaundiced. An immediate operation revealed a small, purulent bladder and one large duct stone. Upon opening the common duct, no bile escaped; in fact, acholia persisted for fifteen hours, and then only the slightest evidence of bile was present. Twelve hours later, however, bile began to flow in fair amount. In this case a cholecystectomy, choledochotomy and appendectomy were done, and the patient made an excellent recovery.

The last of the series I wish to report was in a Catholic priest of about forty years, who was an athlete and worked hard in his parish. When I saw him, in consultation with Dr. Ludwig Kast, he said he was suffering from pain in his abdomen, similar to that in a previous attack, for which he had been operated on thirteen months before. That operation, I was informed, was a cholecystostomy and choledochostomy. Conditions arose that demanded an exploration. A cholecystostomy and choledochotomy were again done, retaining the gall-bladder because the common duct was very much thickened (cicatrical) and a chronic pancreatitis existed. The fact was kept in mind that it might be necessary at some future date to do a cholecystenterostomy. This patient went through the most profound manifestations of shock and collapse for four days that it has ever been my misfortune to see, showing all the evidences of a severe toxemia, similar to those observed in acute pancreatitis. It is now about one year since his second operation, and no biliary symptoms have been complained of.

Combined or additional operations other than those of the hepatic system:

Appendectomy.—Over ten years ago I called attention to associated disease of the appendix, using the unfortunate term “dual disease,” instead of coincident or associated. This fact was well borne out by the second operation upon one of our well-known western surgeons while on a visit to the east during the past few years. I always remove the appendix when the patient’s condition permits it, or when the infection can be limited to the gall-bladder zone. In this series, I have done appendectomy with cholecystostomy sixty-seven times; with cholecystectomy forty-nine times; with cholecystostomy and choledochostomy six times, and with cholecystectomy and choledochostomy fifteen times, making a total of 137

appendectomies in the entire series, over 50 per cent. Of the above number, it happens that the appendix has occasionally been the primary offending member, and the gall-bladder the secondary. One patient with a gangrenous appendix gave a history of gall-bladder trouble for years; she was also two months pregnant. She had an appendectomy and cholecystostomy done without disturbing the pregnancy. In one case a Finney pyloroplasty was done, and in one a gastroenterostomy with choledochostomy. A partial gastrectomy for carcinoma, with cholecystectomy and choledochotomy were done in a woman who was afterward shown at a meeting of the New York Surgical Society. In this case, three years before, I had done a right nephrectomy, a right oöphorocystectomy and an appendectomy. This patient is living to-day, her third year terminating in a few months.

Gastroenterostomy for duodenal ulcer was done in two cases. A gastrotomy for ulcer on the posterior wall of the stomach was done in one case. In one case there was gastric carcinoma. In ten cases there were uterine and ovarian operations not requiring hysterectomy. In one of these there was a large cyst with a pedicle twisted several times. In seventeen of the cases the operation was associated with hysterectomy for fibroids. I have found the gall-bladder involved frequently in recent years in this condition, and, in my opinion, the patient's convalescence is scarcely retarded by these associated operations that are indicated. In six of the cases there was an acute pancreatitis in the hemorrhagic, suppurative or sloughing stages of the disease. Five of these recovered. In all of them a cholecystostomy had been done. One, previously cited, was operated on recently, doing a cholecystectomy. In one there was a mucous fistula which persisted for two years and then healed spontaneously.

Carcinoma of the papilla of Vater was observed once. This patient was operated on twice, first a cholecystostomy and subsequently a cholecystenterostomy being done. This patient has also been shown at a meeting of the Surgical Society.

Perforated Typhoid Cholecystitis.—In one of the cases, a male, during the third or fourth week of his attack of typhoid fever, had a sudden onset of acute abdominal pain, with distention. When I saw him on the following day, he was comatose, and a rapid exploratory operation for suspected perforation of the bowel revealed two large holes in the gall-bladder, with profuse peritoneal soiling with purulent bile-stained material. The wound was rapidly drained and packed and the patient was returned to bed in eleven minutes, quite moribund. He was unconscious for seven weeks, but finally recovered.

In February, 1903, I presented the subject of primary typhoidal perforations of the gall-bladder at a meeting of the Surgical Society, recording the history of a female patient, forty-six years old, with a successful outcome. In my article at that time I recorded the then available statistics of this complication of typhoid, and found that, my own case included, there were thirty-four cases in all, and that of these four had recovered.

Hydatids.—Two patients with this complication have been operated on by me in the past two years. In one, where I did a cholecystectomy and choledochostomy, the hydatid was about the size of a hen's egg. It was located in the liver at the sulcus of the suspensory ligament and was easily excised intact, with secondary suture of the liver. My second case of hydatids will be recorded under the fatal cases.

I have had one case of acute phthisis associated with cholecystitis gangrenosa. In this I did a successful cholecystectomy, but within less than one year jaundice occurred and colic recurred. A further operation was then deemed inadvisable. This was some eight months ago, and I have not seen the patient since.

Hemolytic Jaundice.—This patient was a young man of twenty upon whom I did a cholecystostomy for suspected cholecystitis, followed in six months by a splenectomy. The latter operation was done about eight months ago, with entirely satisfactory results.

A subphrenic abscess occurred in six of my series, with one death. This fatal case is the same one recorded under complicating hydatids.

Transduodenal Operation.—This operation has been done by me three times in my career, successfully in each instance. With the advent of the Blake forceps, I feel the necessity of this procedure has been passed, as with the ordinary choledochostomy opening we can, with this instrument, grasp and remove with or without crushing, all stones, even when well impacted in the papilla of Vater.

Morbidity and Secondary Operations.—These questions cannot be reported definitely until some clearing-house method is established of reporting to the original operator the patient's condition and the necessity for further operations, etc. When some such method is employed, data of value to all, particularly to the prospective patient, can be advanced.

Deaths.—In 1910, out of a series of forty-three of these cases, no deaths occurred.

In 1911 there were fifty-four operations, with four deaths. The first of these was a widow of fifty with general streptococcemia. A cholecystostomy was done in the hope that some benefit might fol-

low, particularly as the patient was slightly jaundiced. Death resulted from a septic endocarditis, the patient surviving the operation by several days. It is possible, indeed, more than likely, that in this instance an unnecessary operation was done, but it is not probable that it hastened the patient's death.

The second death in the series was that of a Polish Jewess, well advanced in years and enormously fat, with double inguinal and an umbilical hernia, all of large size. She came under my care with a general peritonitis, her illness dating back about ten days. A fairly clear gall-bladder history was obtained. Operation revealed a large perforation in the gall-bladder, with pus and bile free in the peritoneal cavity. This patient was apparently on the road to recovery when a fatal pneumonia supervened.

The third case was one of acute hemorrhagic pancreatitis in a man, fifty-five years old, with an illness of ten days' duration. He was moribund when a cholecystotomy was done and many stones removed. Death occurred within thirty-six hours.

The fourth case was that of a man over sixty, upon whom a choledochostomy and cholecystotomy were done. Death followed on the seventh day from embolism, while he was engaged in a fierce argument with his son, a physician, about the necessity of continuing his special nurses.

In 1912 there were sixty-three recorded operations, without a death. In 1913 there were seventy-eight recorded operations, with six deaths, two of them after cholecystostomy.

The first case was that of a man, thirty-eight years old, who had dilated veins and varicosities to such a degree that merely rubbing the exposed mucous surface of the gall-bladder would be followed by a profuse hemorrhage. The veins in the vicinity of the pylorus and stomach were three-quarters of an inch in diameter. Death occurred on the fourth day, and was attributed to acute gastric dilatation.

The second case of this series was that of a man, fifty-five years old, with cardiac myositis, which proved fatal. In this case the operation showed a perforated gall-bladder, with a mural abscess containing air.

The third case was that of a woman of sixty where death followed a choledochostomy done erroneously for supposed duct obstruction which proved, upon microscopical examination of the autopsy specimens, to be a cell destruction by interstitial hepatitis. This patient had been operated on by me some three years before for a profound streptococcus cholangitis. A cholecystectomy and choledochostomy were done, with a stormy convalescence and prolonged

drainage, followed by a condition of health far better than she had enjoyed for fifteen years. After three years she had a sudden recurrence of her jaundice, and at the second operation the bile flowed perfectly clear and in fair quantity. While apparently progressing favorably, an acute nephritis supervened upon a chronic renal impairment, with fatal result.

The fourth case was that of a man, fifty-five years old, with a suppurative cholecystitis, a pericyclic abscess, empyema, and a suppurative hydatid cyst. This patient had suffered from jaundice, with an intermittent temperature, for seventeen days, and was much emaciated. Operation revealed a perforated gall-bladder, with two well-localized abscesses, one on each side of the gall-bladder. Owing to the patient's serious condition, drainage only was done. Several days later, as the temperature still remained high, an exploratory aspiration of the chest was made and 8 ounces of purulent fluid withdrawn. The following day a section of rib was made and a few ounces of murky fluid evacuated. It was then seen that what had been regarded as a typical empyema was a lesion involving the dome of the liver, and upon puncture, over a quart of hydatids in most foul colon communis pus was evacuated. Death followed from exhaustion about two weeks after the operation.

The fifth and sixth cases, one a man fifty-five years old, and the other a woman of seventy-four, both died of nephritis, the first after a cholecystectomy, and the second after a cholecystostomy.

In 1914, up to April 10, there is a series of twenty-six cases, with three deaths. The first was that of a woman with well-advanced symptoms who died from nephritis after a cholecystectomy. The other two patients were males, aged fifty-five and fifty-seven years, respectively. The first was much emaciated and deeply jaundiced, with skin the color of mahogany. A choledochostomy was done and the patient died four days later from embolism. The second patient had already been operated on for prostatic enlargement and his urine contained the bacillus coli communis. There was an intermittent temperature of the Charcot type. A cholecystectomy and choledochostomy were done, showing evidence of a pure streptococcus infection. The patient's temperature dropped from 103.6° to 99° , he developed a generalized maculopapular eruption (septic infarcts) and died on the eighth day.

With the citation of the fetal cases, as given above, I cannot feel that I have been responsible for a single death by doing any additional operative procedure, as it will be observed that of the thirteen deaths, but two of these patients had any complicating disease.

Of the thirteen deaths, eight were in males. The fourth death in 1911 was the result of pancreatitis, and was reported as such in a paper on pancreatitis published during the present year in the "*New York Medical Journal*." The other, the fourth case that died in 1912, required the operations to which he was subjected, excepting the one for supposed empyema, as I am satisfied that my exploring needle must have tapped his hydatid abscess. Nevertheless, the suppurating hydatids were best approached through the transpleural route.

As a conclusion based upon these statistics, I am inclined to perform cholecystectomy more frequently than heretofore.

Two Step Operation.—This is a rarity with me, in fact, has only been considered in several instances when a rapid cholecystostomy for gangrene, etc., was indicated.

These cases in many instances resolve thoroughly and do not invariably return for further operation. Several instances of this type can be cited—one in particular, a sea captain, seventy-four years old, with a history of recurring attacks of gall-bladder colic, was seen by me through the courtesy of Dr. Walser, of Staten Island. At this time he gave a history of acute cholecystitis of some ten days' duration. The signs and symptoms, when seen by me, were those of gangrene with possible perforation. The patient's condition was such that a hurry operation only was feasible. The abdomen was opened, with findings of a gangrenous and perforated gall-bladder filled with calculi. The escaping, purulent bile was limited by omental adhesions. A large tube and iodoform drainage was installed. The patient, during delirium, evidently due to a deficiency in his urinary output, jumped from the second story window of the hospital, alighting upon his heels and fracturing both os calces. Upon returning him to his room, he was free from delirium, remained so and made a perfect recovery both of his gall-bladder involvement and the fractures. He finally died some four years later of pneumonia.

This citation is no argument that these patients all recover, as had he been a young man, his expectancy of life would have been far greater and recurrence of gall-bladder symptoms might have been observed.

I do not believe in the two step operation as advocated by many, but would heartily indorse it in those instances when a primary operation in the ultra serious patients is done for drainage, realizing that obstruction is present or still exists, as in the case of a physician in Bridgeport whom I recently operated upon.

When first called to see him on a Sunday afternoon, his condition was found to be very grave, due, in all probability, to a cholecystitis

gangrenosa, giving at the same time a set of symptoms indicative of common duct stone or pancreatic obstruction. Upon opening the abdomen, a large, distended, acutely thickened gall-bladder was exposed, with profound involvement of his pancreas. It was deemed advisable to drain the gall-bladder only and defer secondary operation to some later day, as it was suspected that the pancreas might be malignant. This was done, with a prompt recovery and closure of the cholecystostomy wound. In view of his recovery and gain the malignant suspicion became doubtful, when suddenly he reported a profound attack of pain and jaundice. Such attacks occurred several times, and he then concluded that he was ready for his second operation. This was done some five or six months after the first. The findings were highly pleasing, although difficult to remove, owing to the adhesions from the previous attacks and operation. The pancreas had resumed normal size and a single stone was found in the common duct. The appendix also was removed. He has made a most satisfactory recovery, gaining quite a number of pounds during the year now passed since his operation.

Such a procedure has been carried out by me in several cases—one of them being another physician in whom, at the second operation, I did a successful transduodenal operation.

Obstruction Due to Gall-stones.—I have operated five times for this condition—four of the patients unfortunately so far gone (fecal vomiting, etc.) at the time of operation, that recovery was impossible. The fifth, a widow, seventy-four years of age, with a clear history of repeated attacks of gall-stone colic, in whom an acute attack—suspected of being appendicular—was observed by several physicians. When I saw her, she was so tender in the right iliac zone as to mislead me into diagnosticating a gangrenous appendix. Operation was done under great difficulties at 1 A. M., an acetylene lamp from an automobile being the improvised light—an assistant, with an infected hand, giving ether; myself and a green nurse doing the operating in a ponderously fat old lady. The incision through the peritoneum was followed by a coil of ileum popping into the wound; the coil was felt to contain a large hard substance, obstructing the ileum about four inches from the ileocecal valve. In addition it was observed by the palpating fingers that there was a tumor of the right ovary, the size of a large lemon, and the suspected appendix was but a chronic one, quite large and adherent. The gall-bladder was not palpated, owing to her grave condition. A rapid enterostomy, with extraction of a stone the size of a large walnut, was done, the ovarian tumor and appendix were removed, and a drain was placed in the peritoneal

cavity for forty-eight hours. A speedy recovery was effected. About two years later she again suffered an attack of gall-bladder colic, which rapidly subsided. She has now gone by her seventy-seventh year, and for over one year no further trouble with the gall-bladder has been evident.

Trauma.—I cannot close this discussion without citing the history of a patient upon whom I operated recently, bearing upon trauma as a factor with a distinct medicolegal aspect.

The patient, a young man, was brought to me with the history of being struck, a few days before, in the upper right abdomen by a kickback from a piece of wood that he was sawing with a circular saw in the factory of his employer. His condition was such that no careful history of his previous condition was taken. An operation for cholecystitis or possible rupture of the gall-bladder was done; a gall-bladder with cloudy bile was opened—the terminal fluid being milky white. Pathological examination failed to reveal pus organisms, but clinically the patient evidenced a typhoid chart and, upon examining him for typhoid, Widal was found positive. The patient was, or is now, in the hands of his attorney, trying to prove trauma as the cause of his cholecystitis, while we in a more careful history have obtained the facts that he was ailing for quite some time before he was struck by the piece of wood.

A work about the *x*-ray diagnosis: Recently Pfahler, of Philadelphia, in the *Journal of the American Medical Association*, states that although "He had 74 per cent. definite evidences of stones by the *x*-ray, he felt that 50 per cent. in the hands of himself and other radiologists would be a fair average. That to show gall-stones, the greatest care and repeated exposures are necessary. Also that lime salts must be present with cholesterin, etc., to show a shadow."

60 WEST FIFTY-SECOND STREET.

ANASTOMOSIS OF THE GALL-BLADDER TO THE STOMACH: "CHOLECYSTOGASTROSTOMY."*

BY

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THE anastomosis of the gall-bladder to the stomach or the formation of a gastrobiliary fistula is an operation which has not received sufficient consideration. The operation has been variously

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called "biliary gastrostomy," "cholecystogastric anastomosis," "gastrobiliary anastomosis," "cystogastrostomy," "gastrocholecystostomy," "cholecystogastrostomy." The latter term seems to be the preferable one.

The indications for the performance of this operation are the same as for cholecystenterostomy, namely, chronic obstructions of the common duct. On first thought it would seem that this operation is not a rational one as the presence of bile in the stomach might be injurious to digestion, therefore the operation would not be based on sound physiologic principles. A careful consideration of the experimental and clinical evidence which may be found in the literature pertaining to the operation will convince one that the operation is not only rational but that it possesses certain advantages over all other methods of anastomosing the gall-bladder to the alimentary tract. In our text-books on surgery we learn that the gall-bladder can be anastomosed to the duodenum, jejunum, ileum, and colon.

The classical operation of cholecystenterostomy is the anastomosis of the gall-bladder to the duodenum for the reason that it so nearly reproduces the normal situation for the entrance of bile into the intestinal tract. This classical operation is often difficult to perform on account of the immobility of the duodenum. There is also danger of leakage of pancreatic secretion when the union is not perfectly made, a most distressing accident when it occurs. On account of the difficulty of anastomosing the gall-bladder to the duodenum and because such operations must be performed on greatly debilitated patients, the primary mortality of cholecystenterostomy is necessarily high. While the anastomosis between the gall-bladder and the jejunum or ileum is not so difficult to perform as compared with the classical operation, it is not, strictly speaking, an anatomical operation, and the danger of ascending infection is greater. This operation is not so easy of performance as the anastomosis between the gall-bladder and stomach. Owing to the great danger of infection, the anastomosis between the gall-bladder and colon is the least desirable and should be abandoned.

In speaking of the mortality for cholecystenterostomy, Brewer(1) does not think the operation justifiable for cancer of the pancreas or common duct. He agrees with Moynihan who says that cholecystenterostomy is a dangerous operation, its mortality being about 75 per cent. which makes it prohibitive. He is inclined to believe that all such cases should be left alone. This opinion is, in all probability, correct, but must give way to the lessened mortality rate

following the anastomosis of the gall-bladder and stomach in such cases.

The chief diseases which require such operative relief on account of the obstruction to the common duct and subsequent jaundice which they produce, are cancer of the common duct; cancer of the head of the pancreas; chronic interstitial pancreatitis and in cases of obliteration of the common duct from severe infection from cholelithiasis. In all of these conditions the general condition of the patient is, as a rule, very bad and the operative procedure to be employed must be a short one. As the gall-bladder lies normally in close proximity with the pyloric end of the stomach, and as this portion of the stomach is, as a rule, mobile, an anastomotic operation between these organs is obviously easy to perform.

The first operation of this kind to be performed was made by two Vienna surgeons, Max Wickhoff and Franz Angelberger(2) Sept. 21, 1892. The patient was a female, aged forty-five, suffering with cholelithiasis with chronic obstruction of the common duct. The anastomosis was made between the gall-bladder and the lesser curvature of the stomach. Patient made a perfect recovery.

There is abundant experimental evidence to show that the presence of bile in the stomach is not only not injurious to digestion, but causes no discomfort whatsoever. As early as 1887, Oddi(3) introduced bile into the stomach under various conditions and studied the results; among other experiments he made cholecystogastric fistula. He concluded that the presence of bile in the stomach before and during that period of digestion in no wise diminishes the power of the gastric juices. He demonstrated the presence of bile in the ventricle of the stomach during advanced digestion, with the peptones not precipitated.

Oddi stated that the opinion of the majority of physicians and physiologists who believe that the bile may give rise to grave disturbances of the stomach and vomiting, is not correct. Oddi also was of the opinion that a cholecystogastric fistula may probably be applied more advantageously in certain affections of the bile passages than the cholecystointestinal fistula.

Cannac(4) in 1897, reporting his experiments of cholecystogastric fistula on seven dogs, stated that the animals suffered no inconveniences from the entrance of bile into the stomach. He goes so far as to state that gastrocystostomy should be given the preference in every case where cholecystenterostomy is indicated.

Masse(5) in 1898, relates that cholecystogastrostomy was found very successful in animal experiments at the laboratory for operat-

ive medicine at Bordeaux, when used upon dogs. The digestive function remained normal. In most of the animals experimented upon, a ligature around the choledochus along its middle portion was applied, and the gall-bladder anastomosed to the stomach. Cannac also practised this double operation in a number of animals in October, 1897. Several dogs operated by Cannac in October were submitted to autopsy in June and July following. Occlusion of the choledochus was found to be complete and the fistula between the gall-bladder and stomach permeable. These results obtained in dogs led Cannac to recommend the introduction of this operation upon man in case of absolute obstruction of the choledochus.

Mocquot(6),(7) made experiments with anastomoses between the bile passages, stomach, duodenum, and jejunum. His experiments were conducted on dogs which were allowed to live and after a long period of time autopsied. Mocquot's conclusions were as follows: The danger of infection of the gall-bladder is not very great, especially when the anastomotic opening is made small and exact so that no ulcer occurs at the anastomotic site. He found bacteria in the gall-bladder and in the liver itself. In two instances the liver showed changes which resembled biliary cirrhosis. In the case where the gall-bladder was anastomosed into the stomach, these changes were not so marked as in the case where the communication was made between the gall-bladder and jejunum. "It seems that the introduction of bile into the stomach has caused no disturbances of gastric secretion, and my experiences," says the writer, "are in accord with those of Dastre." Neither dog shows any biliary infection. He observed one dog that had been killed six months after cholecystoduodenal anastomosis and found him in perfect health and no signs of ascending infection of the biliary passages. Masse and also Radviewski did cystogastrostomy on dogs and noted no biliary infection, but more recently Hubicki and Szerszynski (*Gaz. Lebarsk.*, v, 30, Oct. 8, 1910) reported results in seven dogs in which cholecystenterostomies were done and found heavy infection of the biliary passages and liver in four. Their results confirm those obtained by Bozzi. Mocquot believes that cystogastrostomy is less liable to cause biliary infection than cystenterostomy, and prefers the former operation. In 1912 George Milton Smith(8) studied the changes in the gall-bladder following autoplasmic transplantation into the gastrointestinal tract. Smith's conclusions were as follows:

1. Autoplasmic transplantation of the tissues of the gall-bladder into the gastrointestinal tract is followed by definite histological

changes as a result of adaptation of the transplanted tissue to new environment.

2. Gall-bladder tissue transplanted into the gastrointestinal tract undergoes hypertrophy of the mucosa with development of new lymphoid tissue. When transplanted into the stomach, the hypertrophy of gall-bladder mucosa may become especially marked, and be associated with active proliferation and degeneration of the transplanted cells with mucous production.

3. The increase in lymphoid tissue, developed in the gall-bladder transplanted to the surface of the intestinal tract, whereas a considerable decrease of lymphoid tissue occurs in gall-bladder transplanted into the sterile peritoneal cavity, affords evidence that the development of lymphoid tissue is in response to bacterial environment and possibly to other chemical or mechanical causes injurious to the tissue.

4. There is no experimental evidence that a metaplasia occurs in gall-bladder tissues in fistulous communication with the intestinal tract, such as has been described as taking place in the human gall-bladder under similar conditions.

In 1914 Wiedeman(9) made animal experiments to determine the effect on digestion of the abnormal entry of bile in the gastrointestinal tract. His experiments consisted in making anastomoses between the gall-bladder and the stomach and also the small intestine near the boundary of the jejunum and the ileum. His conclusions were that even in the presence of large quantities of bile in the stomach contents, in no instance was the acidity of the stomach lessened. Immediately after the experiment the motility of the stomach was not affected, although at a later period the motility was influenced. The intestinal digestion suffered no changes when the bile was diverted into the stomach. The author came to the conclusion that changes in digestion were greater when the gall-bladder was anastomosed to the small bowel.

The clinical evidences of the bile being well tolerated in the stomach and not affecting digestion, we find not only in the recorded cases of gastrocholecystostomy, but in the everyday operation of gastrojejunostomy for ulcer of the stomach. It is well known that more or less bile enters the stomach after the latter operation.

Monod(10) in 1896 probably made the second operation of gastrocholecystostomy. The patient, a male aged fifty-five, was suffering from icterus due to an obstruction of the choledochus. Exploratory laparotomy, no stones found. Cholecystogastrostomy with a

Murphy button was performed. The patient died next day. Autopsy revealed cancer of the pancreas.

Terrier(11), in 1896, reported that he had performed a gastrocystostomy in December, 1895. The patient was suffering from chronic icterus due to a neoplasm of the head of the pancreas and degeneration of the neighboring glands. Patient died ten months later.

Jaboulay(12), in 1898, recommended cystogastrostomy as the operation of choice in permanent obstruction of the choledochus whenever a tumor complicates the condition. He reports a case of a male, aged forty-six, with icterus for five months; tumor; cancer of pancreas; cholecystogastrostomy, with recovery. The patient did not vomit bile after operation. The icterus rapidly diminished and gave evidence that the bile was circulating in the bowel again, urine became clear in eight days, and the stools became colored.

Montagnon and Duchamp(13) report a case of cystogastrostomy. The patient was a male, aged fifty-five, with icterus for about five months; suspected neoplasm of choledochus; operation April 5, 1899. Small neoplasm of head of pancreas; gall-bladder was dilated; no stones; cystogastrostomy; good recovery. The anastomosis of the gall-bladder to the pyloric end of the stomach gave rise to no digestive disturbances, no vomiting, etc.

Ferd Krumm (14) in 1901 reported a case of chronic choledochus occlusion in which he performed cystogastrostomy. The patient died seven weeks later. The autopsy showed a complete occlusion of the ductus choledochus due to a tumor of the head of the pancreas. Gall-bladder found free and anastomosing with stomach. Cancer metastases involved other organs.

Perrin(15) in 1902 in an extensive thesis on cholecystogastrostomy for irremediable obstruction of the choledochus deals with the operation, its history and indications in great detail. He reports a series of fourteen cases collected from the literature up to that time (see Table). He states that this operation was performed rarely prior to and including 1898; three times it was done in 1899; four times in 1900. This progress is largely due to the experimental work done by Masse and Cannac. To these authors is due the credit of placing cystogastrostomy on a rational scientific basis and making it known.

In his conclusions he states that permanent occlusion of the choledochus is often difficult to diagnose without exploratory operation. Cholecystoduodenostomy seems to be rather easy of accomplishment when no malignant growths are in the vicinity. But in the difficult cases where neoplasms exist cholecystogastrostomy is to be preferred. It is an easy, rapid, scientific, and rational operation,

both anatomically physiologically and functionally. The diversion of the bile into the stomach does not produce any digestive disturbances. Perrin thinks this has been proven by Dastre, Oddi, Masse and Cannac, and in the fourteen observations compiled in his thesis, as well as in the many cases of spontaneous cholecystogastric fistulas found at autopsy.

Perrin concludes that cholecystogastrostomy is, therefore, a permissible operation and becomes the operation of choice when cholecystoduodenostomy is difficult or contraindicated.

Cernezzi(16) reports a case of a female, aged sixty-four, with chronic jaundice; operation was performed with aim of doing a cholecystenterostomy. When this was attempted he found it impossible on account of adhesions, he then performed a gastrostomy with good results. Operation December 3, 1905.

De Francesco(17) reports a case of a male, aged fifty; with suspected cancer of the head of the pancreas; exploratory incision showed the head of the pancreas hardened, but not greatly enlarged. The choledochus did not contain gall-stones, but the gall-bladder was distended; cholecystogastrostomy with pyloric end of stomach was performed; recovery followed.

Wm. Eichmeyer(18) from the clinic of Prof. Hans Kehr at Halberstadt, reports brief histories of twelve cases of gastrocystostomy. He states that anastomoses between the biliary system and intestinal tract were made during the past three years in twenty-two cases. In thirteen cases a communication of the gall-bladder with the gastrointestinal canal was effected. Kehr has repeatedly called attention to the fact that he prefers anastomosis of the gall-bladder with the pyloric end of the stomach, to that with duodenum and especially the ileum, jejunum, or even transverse colon. Although others consider this method as the "most impractical," he points to their cases of cystogastrostomy (about forty cases) which showed neither biliary vomiting, nor loss of appetite or other complaints as the result of bile flowing into the stomach. The advantages of this method, according to Kehr, lies in the fact that the pyloric end of the stomach in the majority of cases is readily approximated to the gall-bladder and the suture is easily and accurately made on account of the thicker wall of the stomach. Mayo Robson's preference for anastomosis between gall-bladder and transverse colon is frowned upon by Kehr as the bile here is effective only in the terminal end of the bowel and besides there is great danger of infection.

In his recent communication Kehr(20) states that he has performed cystogastrostomy sixty-two times and again emphasizes the

best of all anastomotic operations because it is the easiest to perform and is rarely followed by severe ascending infection. Kehr has not as yet published the details of these operations.

To the above recorded cases, the author desires to add the following case report:

Mr. C. Y., male, aged sixty-four, admitted to St. Vincent's Hospital April 10, 1914, referred by Drs. Brailey of Swanton, Ohio, and Dr. Ingrahan, of Curtice, Ohio. Farmer by occupation.

Family History.—Father died of causes unknown. Mother living and well as eighty-five.

Previous History.—Muscular rheumatism(?) in right leg and thigh. At twenty years of age, two attacks of fever. In bed three to five weeks.

Present Illness.—Began about two years ago. On January 15, 1914, consulted a physician for severe constipation and painful feeling in right side of abdomen. Has been jaundiced for the past two months. Pain has not been severe at any time, although present for past four weeks. At present time bowels move easily. Abdominal distention is present nearly all the time. Has lost about 30 pounds in weight.

Status Presens.—General appearance of patient is that of being very ill. Nutrition fair. Abdomen, liver palpable; three finger breadths below costal arch the gall-bladder is enlarged.

Diagnosis.—Secondary carcinoma of liver and bile ducts. Dilated gall-bladder due to obstruction of common duct. Primary carcinoma of colon(?). An anastomosis of gall-bladder to stomach was advised for palliative purposes to relieve the severe jaundice.

Operation.—St. Vincent's Hospital, April 11, 1914. Right rectus incision; patient placed in elevated gall-bladder position. Cecum ascending and transverse colon adherent to each other and the tip of the appendix intimately attached to the transverse colon. The gall-bladder was found to be greatly distended, containing no stones nor were there any stones palpable in the ducts. The head of the pancreas was very much enlarged. No enlarged glands. The cecum was brought up into the incision and in freeing the appendix from the transverse colon, a small hole was torn in large bowel. The hole was closed and the appendix ligated and removed in the usual manner. Pylorus and stomach normal free. The gall-bladder was aspirated after pulling over the pylorus and walling off the abdominal cavity. Very dark thick bile evacuated. Fundus of gall-bladder sutured to the stomach serosa with interrupted No. 00 chromic catgut. Pylorus was then opened and the usual form of anastomosis made, using No. 00 chromic catgut sutures. Abdominal closure. Patient made an uninterrupted recovery. Healing of the wound was primary. On account of the debilitation of the patient, he was not discharged from the hospital before the twentieth day. Jaundice disappeared completely in about three weeks. A recent examination (September 10, 1914) reveals the patient in a normal state of health. At no time has he suffered any apparent inconvenience from the presence of bile in the stomach.

No.	Operator	Date	Pathology	Result	1902
1	Wickhoff and Angelberger.	Sept. 2, 1892.	Cholelithiasis.....	Recovery.....	Reported by Perrin.
2	Terrier.....	Dec. 19, 1895.	Cancer of pancreas.	Lived 10 months.	Reported by Perrin.
3	C. Monod....	June 1, 1896.	Cancer of pancreas.	Died.....	Reported by Perrin.
4	Lejahrs.....	Oct. 20, 1896.	Cancer of pancreas.	Died.....	Reported by Perrin.
5	Quenu.....	April, 1897.	Cancer of pancreas.	Lived 3 months.	Reported by Perrin.
6	Giordano.....	May 6, 1897.	Sclerosis of pancreas.	Died.....	Reported by Perrin.
7	Jaboulay....	Dec. 18, 1899.	Cancer of pancreas.	Lived 14 months.	Reported by Perrin.
8	Duchamp....	April 5, 1899.	Cholelithiasis.....	Lived 13 months.	Reported by Perrin.
9	Picque.....	June 28, 1899.	Cancer of pancreas.	Lived 11 months.	Reported by Perrin.
10	Jaboulay....	Dec. 18, 1899.	Cancer of pancreas.	Lived 4 months.	Reported by Perrin.
11	Lejahrs.....	Feb. 4, 1900.	Cancer of pancreas.	Died.....	Reported by Perrin.
12	Jaboulay....	Aug. 30, 1900.	Cancer of pancreas.	Lived 4 months.	Reported by Perrin.
13	Moynihan....	1901.	Rupture of intestines at duodeno-jejunal flexure.	Recovery.....	.....
14	DeFrancesco Donato.	1906.	Cancer of pancreas. (?)	Recovery.....	Reported by Perrin.
15	Ferd Krumm.	1901.	Cancer of head of pancreas.	Lived 7 weeks...	Reported by Perrin.
16	Cernezzi (16).	Dec. 3, 1905.	Chronic jaundice adhesions about ducts.	Recovery.....	.....
17	Jacobson....	April 10, 1914.	Chronic intestinal pancreatitis. Severe jaundice.	Complete recovery.	.....

Prof. Hans Kehr(20) (p. 620) states that he has performed the operation of cystogastrostomy sixty-two times. No details given.

In all there are seventy-nine recorded operations for cholecystogastrostomy in the literature, sixty-two of which have been performed by Prof. Hans Kehr of Berlin. The remaining seventeen cases detailed by various operators, show that eleven times the operation was performed for malignant disease of the pancreas, and six times for benign conditions. There were three immediate deaths following the operation for malignant disease. The eight patients who recovered lived for periods ranging from seven weeks to fourteen months after operation. In the six benign cases there was one death and five recoveries.

TECHNIC OF OPERATION.

After the abdomen has been opened the distended gall-bladder is thoroughly aspirated. The opening in the gall-bladder is then enlarged to about 3 cm. in diameter and a strip of gauze placed within the lumen to prevent further leakage of bile during the anastomosis. The pyloric end of the stomach can be readily pulled forward and a point just within the pyloric ring is selected for the incision into the stomach. Incision should be longitudinal about 3 cm. in length. The serosa of the stomach should be incised and sewn to the posterior margin of the gall-bladder by interrupted sutures before the stomach cavity is opened. After the incision of the mucous membrane of the stomach interrupted sutures unite it to the mucous membrane of the gall-bladder. The mucous membrane suture is now continued around the entire anastomosis. A final serosa suture completes the operation.

All suture material should be o or oo chromicized catgut. Kehr recommends covering the anastomosis with an omental graft. The abdomen is closed without drainage.

CONCLUSIONS.

1. The operation of cystogastrostomy has the same indication as that for cholecystenterostomy.
2. The presence of bile in the stomach after cystogastrostomy does not interfere with digestion or cause the patient any inconvenience.
3. The operation is very easy to perform, therefore it offers a palliation and prolongation of life to a class of patients which as a rule are considered inoperable.
4. On account of the small danger of ascending infection it should be the choice of methods when it becomes necessary to anastomose the gall-bladder to the alimentary tract.

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DEPARTMENT OF PEDIATRICS.

TRANSACTIONS OF THE AMERICAN PEDIATRIC SOCIETY

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27, 28, 1914.*

The President, SAMUEL MCC. HAMILL, M. D., in the Chair.

(Continued from August.)

THE CALORIC VALUE OF THE DIETS OF SICK INFANTS.

DR. J. C. GITTINGS, Philadelphia, said that in the course of a careful reconsideration of cases seen in the infant wards during his services at the Children's Hospital for the past three years it had seemed desirable to measure and tabulate the nutritive value of the various dietaries in order to get a comprehensive view of his feeding methods. In computing the caloric requirements for the various weights in the table the factors used were the highest figures in the tables, viz.; First three months 50 calories; three to six months 45 calories; six to twelve months 40 calories; twelve to twenty-four months 40 calories. In computing the caloric requirements based on the weights on admission the same values were used.

The total number of cases tabulated was 125. Of these 35 were cases of infantile atrophy, 72 cases of acute or chronic gastrointestinal disease, and 18 of miscellaneous diseases, including pneumonia, bronchitis, ulcerative stomatitis, typhoid fever, scurvy, syphilis, tubercular meningitis and pylorospasm. Two standards were used for comparison. First, the caloric requirements of each child calculated on the basis of his weight on admission. Second, the caloric requirements for an infant of average size and of the same age.

The noteworthy features of the tabulated results were as follows: The percentage of deficiency in caloric requirements based on weight on admission was reasonably small but the small gain, one-fifth of an ounce a day for all cases, two-fifths of an ounce for recoveries, suggests that it might have been possible to have exceeded the caloric minimum with benefit. The complicated atrophy cases showed about the same deficiency as the recoveries, but in the uncomplicated atrophies and in the miscellaneous groups where no contraindication to full feeding existed, the diet exceeded the minimum requirement and the gain was proportionately large. In the gastrointestinal groups a similar difference was noted but uncomplicated

cases showed an actual deficiency instead of excess and received less food than careful attention to caloric requirements would have indicated. Certain well-known clinical facts had been corroborated, and in the main, the truth of the danger to the infant's organism of underfeeding was clearly substantiated. The study offered a stimulus to greater care in the selection of dietaries since the percentage of the deficiency in some instances was startlingly large and suggested the possibility that a more judicious substitution of food ingredients might have prevented some of the loss. The deficiency of caloric value of all the diets compared with the requirements of normal children of the same age formed an interesting comparison and must be judged with a view to the deficiency in weight on admission as compared with that of a normal child.

The value of a conclusion based on general averages could not always be applied to the individual case, and the danger of allowing theoretical considerations outweigh clinical deductions must be emphasized. The estimation of the caloric value of diets must not be considered as a compulsory dietetic indication, and due regard must be had to the effect of diet on digestion. On the other hand, it was undoubtedly true that caloric deficiency or excess, if persisted in, was reasonably sure to be followed by nutritive or digestive disturbances. The results corroborated in general the impression that cases of acute gastrointestinal disturbance with fever, vomiting, or diarrhea, receive a diet more or less deficient in caloric value, and that gain in weight, on the average went hand in hand with the administration of adequate nourishment.

DISCUSSION.

DR. CHARLES HUNTER DUNN, Boston.—I have always felt from my clinical observations the fallacy of the minimum caloric requirement. We have tabulated the caloric value of the diet taken by about all the infants in our wards and the results differed from those of Dr. Gittings. He reports that the extremes in the number of calories required by different infants is not so great as to impair averages. Our experience is different in that the extremes were so great that no conclusions could be drawn on any system of averages that could be of value. The method of taking normal babies and average results is apt to be misleading, and where there are wide extremes the average may be absolutely false for every individual baby. Some babies made no gain on the lower caloric values and gained when the calories were increased, and in some the minimum number of calories had to be doubled before the infants began to show a gain. The problem is so complicated by individual differences in nutrition and in digestive power that conclusions are not of value even as a guide in the average case.

DR. CHAPIN.—I am glad Dr. Dunn has spoken as he has for I also wish to protest. We have overestimated the value of the caloric method of feeding infants. It is the assimilation of nutrition and not the heat production that is of value. In 1911 I wrote a paper in

which I emphasized the point that the different food elements are not interchangeable in different individuals. It should be remembered that the food elements must be in the proper proportion and that they are not interchangeable. In feeding infants where we must provide for growth it is not so much a problem of heat production as of whether the food is capable of causing growth.

DR. B. S. VEEDER, St. Louis.—Dr. Talbot's paper upsets our ideas of physiology and the relation of body surface to caloric requirements. I would like to ask what method of calculating the body surface he employed. It seemed that according to his idea the caloric requirement would be in proportion to the activity and that he is comparing babies doing different forms of work and begging the question.

DR. JACOBI.—What would be the difference in the results between small babies, underweight babies, and those that are atrophic in consequence of having been sick?

DR. ROLAND G. FREEMAN, New York.—Some of the points brought out correspond to our clinical experience that the fat babies require less food than the poor marasmic ones to whom we give much.

DR. KERLEY.—Wishing to test the accuracy of the estimated caloric requirements in growing children I made observations on children whom I could keep under observation and it seems that some children require more than the estimated standard. It also seems to be true in older children that the number of calories required is dependent on activity.

DR. GITTINGS.—I did not draw definite conclusions in my paper. I wished to see if there was deficiency in the diets we were giving. Generalizations are dangerous and I have not attempted to make any. I found very few extremes and presented the paper for the purpose of discussion.

DR. TALBOT.—In answer to Dr. Veeder's question—the tables passed showed the figures of May, Howland and Lissauer. Lissauer's original articles will explain your criticism. May's formula was made on the basis of two normal babies, while we had thirteen babies, one normal, one one-half to one kilogram under weight, and the rest were atrophic. To estimate the body surface I started by getting shadow photographs and calculated from the perimeter. In regard to Dr. Veeder's last point, these children were only observed when they were not doing any work and I fail to see how the question of work comes in unless the question of digestion itself is considered and that adds about three per cent. to the minimum heat production. In answer to Dr. Jacobi's question one of the charts showed babies of the same weight and length but of different ages, but all under weight. The eight and one-half months baby was naturally thinner than the four months baby of the same weight and the heat requirement was greater in the older children in all instances though the weight and body surface were the same. As has been observed clinically babies underweight are apt to be muscular because they cry a great deal and as they are more muscular it is apparent that more heat is required to maintain the body heat.

THE FEEDING OF MALNOURISHED INFANTS WITH HIGH PROTEINS AND CARBOHYDRATES AND VERY LOW FAT VALUES.

DR. D. J. MILTON MILLER, Atlantic City.—The method which I wish to present is the result of slow convictions and clinical experience and deals with no theories of malnutrition. The feeding of this class of babies has always been a stumbling block to the pediatrician. Most of the feeding in these cases has been haphazard. The most successful method of nourishing these children is by human breast milk, and too much time is wasted in seeing food substitutes before wet nursing is resorted to. Buttermilk, Esiweisse milch, Keller's malt food have been tried and all are applicable for only a short period. The low fat and high carbohydrate content are characteristics of these preparations. Condensed milk, Keller's malt food and the proprietary foods have all been experimented with, and have prepared the way for more generally applicable methods. Many infants showing an intolerance for cow's milk can become accustomed to it by feeding minute quantities and increasing the amount at short intervals. No infant should be long on a fat-free diet. When the fat is reduced to minute proportions there should be a relative and often an absolute increase in the carbohydrates. Finkelsteins views are now quite generally accepted that there is no injury from the proteid. In my cases the percentage of proteid was never excessive. I have not been impressed by the injurious effects of the sugar for if there is acidosis this is not serious as it may readily be corrected. The series in which I made my observations did belong to the extremely atrophic and marasmatic class. Skimmed milk formed the basis of the formulas used with one to one and three-quarter per cent. fat. Floured dextrin or dextro-maltose were added. The children were not kept long on a fat-free diet though the percentage of fat might always be below that of the normal formula. Eleven children were fed on this principle and the results were very favorable.

THE GOOD RESULTS OF LOW FATS AND HIGH PROTEIDS IN CASES OF ARTIFICIAL FEEDING IN INFANTS.

DR. PERCIVAL J. EATON AND EDWARD B. WOODS, Pittsburg Pa.—At the 1912 meeting I presented a short paper entitled "Problems of Infant Feeding Illustrated by Cases and Charts." We have continued that general plan of feeding in all suitable cases and to-day bring a series of cases and charts from one of our hospital services showing what can be done with infants whose heredity is not of the best and whose home environment has been bad. These cases were uniformly in very poor condition and are typical of the feeding cases admitted to the Children's Hospital in Pittsburgh. Certified milk and gravity cream from certified milk were alone used. No formulas were pastuerized or sterilized. Mead's dextri-maltose was used in each case and a proper quantity of citrate of soda, about 1 grain to each ounce of milk and cream in the mixture. The first case was

admitted because of cough, loss of weight, and diarrhea. The child was put on barley water and then defatted milk was added in increasing proportions, and finally it was put on modified milk, which from time to time was increased in amount and strength, as the condition of the child demanded. The following formulæ were used:

Formula	1	2	3	4	5
Fat.....	1.70	2.5	2.3	2.3	2.3
Proteid.....	1.50	1.66	1.66	1.71	1.85
Amount in ounces.....	36	38	42	49	49

The percentage of fat in the formulæ used in the other cases reported was much the same as in this excepting in one case where it had been excluded for a short time entirely for sufficient reasons.

The author emphasized some of the points made in his paper two years ago. The most important was that babies fed according to this general plan, even in hospital work, are less inclined to be ill and have a more stable life as well as a very consistent growth. Second, the formulas should be adapted in quantity and quality as closely as possible to the individual infant. That is, the balance between fat and proteid should be maintained for the given infant. Third, these formulæ, and all that we use now-a-days are practically home modified mixtures, which Bowditch and Bosworth have shown are more nearly correct than are laboratory mixtures, at least as a rule. Finally we desire to call attention to the printed form which has been referred to as having been filled out each time a new formula was given, whether in hospital or private practice. It is so simple and complete that we rarely find a mother or nurse so stupid as to be unable to carry out its directions.

DISCUSSION.

DR. MORSE.—These two papers, as well as all others speaking of a method of infant feeding, are a distinct step backward; we are past that period. Any one can bring out a series of cases that get well on low fats and high proteids and series can be produced in which the exact opposite could be shown. The same is true in regard to sugars; series of cases can be produced in which the feeding of a high percentage of sugar has been successful and others in which a low percentage of sugar has been equally successful can be shown. By a study of the history, the symptoms, the examination of the stools, etc., the food must be planned to meet the needs of the individual baby.

DR. JACOBI.—I would simply like to say that I disagree with the last remarks. Rules are not made for the individual but for the general population. There is an average health standard for the baby, an average health standard for the child, and an average health standard for the adult. Dr. Morse speaks from experience and so do I. It is possible to be guided by the rule. Not every case need be fed from the individual standpoint from the beginning; the general rule may be applied at first and only when the individual

does not develop properly under the general rule may the physician show his shrewdness in meeting the special requirements of the individual. The remarks in the paper were correct and it is a question whether it would be necessary to repeat them if the old papers that have been written were read, and then perhaps the new ones would not need to have been written. As to the remark that raw milk and boiled milk do not behave in the same way in connection with the appearance of the feces, those who read French and German periodicals and neglect the American may remember seeing an article in a German publication in which a German physician claims to have discovered that raw milk always results in curdled stools and cooked milk does not. This discovery has been made at least one hundred thousand times by mothers and by doctors occasionally. It does no harm to repeat old stories, for babies will still turn up, and will be found suffering with the same troubles as formerly. We should study our own literature and remember that short articles do as well and sometimes better than long ones.

DR. CHAPIN.—The pendulum has swung so far the other way that it seems to me it is going too far toward low fats. The children in institutions do not digest fats well but one could get over this by not keeping the children in institutions. The remedy is fresh air. The children need individual care and fresh air to assist in the oxidation of the fats. It is to be feared that the feeding of low fat percentages may be productive of a crop of rickets. The normal woman's milk is not so low in fats and the proper proportion of food elements must not be interfered with. As long as we insist on feeding large quantities of milk sugar we will see diarrhea and burning stools. There is plenty of milk sugar in all milk.

DR. J. H. MASON KNOX, Baltimore.—In the feeding during the latter part of gastrointestinal disturbance a small quantity of skimmed milk added to cereal and then gradually increased in amount is better than whole milk. As to the sugar I very seldom see an intoxication which can be attributed to sugar, nor is there very much starch intolerance and not much starch in the stools. The treatment consists in giving cereal and gradually increasing the quantity of scalded diluted skimmed milk and then gradually going on to whole milk.

DR. ROGER H. DENNETT, New York.—In these difficult feeding cases the individual variation is the main thing. In the earlier method proteids were decried and alkalies were added, certain dilutions, and whey proteid, and peptonization were all advocated as the only method of feeding at one time and series of cases were then reported with just as good results. Then lactose was regarded as harmful. Then the casein was regarded as harmless and the trouble attributed to fats, sugars, or salts. Every one of these ideas had observations to back them and every one was true of certain series of cases. One should accept them as a partial glimpse of the truth in infant feeding. There are a number of babies that will tolerate a high percentage of fats but will not tolerate a high percentage of proteids. In a case in which one cannot decide from the history what is at fault one is apt to begin with a high proteid and low fat

formula as described in the two papers until there is evidence that a change is needed when one must select what seems applicable. Speaking of a method is certainly a distinct step backward. One may recognize every method as a measure to be used in certain cases and all methods as so many weapons each applicable to certain individuals while waiting for finer methods of diagnosis so as to gain by an earlier selection of the most suitable diet for the individual.

DR. ABT.—I agree that there is no method of infant feeding and that each infant must be considered by himself. We must consider the baby from the standpoint of tolerance for the food and the food as to how much it can do in the upbuilding of the baby, and also how much injury it can do. All progress must be made in the direction of meeting the needs of the individual baby.

DR. MILLER.—As to Dr. Talbot's question I do not know why boiling milk prevents the curds. I have never seen any but temporary injury from high percentage of sugar and acid burning stools can be rectified by cutting down the sugar and they may occur on any of the sugars. I did not call the ideas expressed in my paper a method; I do not believe in a method myself, but Dr. Morse has a method himself; he tries to adapt the food to the babies peculiarities, to do this he begins with a definite percentage of fat and then increases it according to the indications. Children kept long without fats will develop rickets; the point is to increase the fats as quickly as possible. Marasmic babies sometimes do well on fats from the very first.

DR. EATON.—In answer to Dr. Holt's question as to the condition of the children in his series, I would say that they were the average children met with in the hospitals. They were picked because they were miserable. Dr. Morse's criticism is good. We used the general plan at first. In the paper I made a plea for the recognition and study of the individual infant, and the adaptation of the food to the infant.

The children fed as I have outlined do well in not having bilious attacks or food poisoning. They all did better on a food containing a comparatively high proteid and a comparatively low fat content.

A PRELIMINARY REPORT ON THE CHEMICAL ANALYSIS OF INFANTS' STOOLS.

DR. HOLT stated that there were a number of interesting questions upon which a comparison of the chemical values in stools of different kinds would throw light. For purposes of comparison stools had been classified into three varieties, formed stools, moderately loose stools, and very loose stools. The stools were not taken from cases of severe intoxication but from the average difficult feeding cases of the better class of hospital cases. The number of stools in twenty-four hours were not considered but only the entire twenty-four hour specimen. In all, analyses were made of 112 daily specimens. Charts showed the percentage of water, nitrogen and the various salts in each of the varieties of stools. The carbohydrates did not appear in the results of the analyses as such. This report was only

preliminary and definite conclusions were not ready for publication but it was believed that further work along these lines would throw light on some of the problems of infant feeding.

DISCUSSION.

DR. SOUTHWORTH.—This is extremely interesting work that Dr. Holt has begun to do and if he perseveres I prophesy that a great deal of good will come from the study of loose stools and formed stools. It may point the way to a method of bringing the condition of the intestinal digestion to a point where it will pass more slowly through the intestines. Just how this will be brought about I do not know, but so much depends on whether the stools are hurried along without an opportunity for absorption or whether the early digestion splits the food into irritant substances which increase peristalsis and permits their escape before the proper absorption has taken place. I would like to ask Dr. Holt whether he has met with the paradoxical condition that children who are constipated often lose in weight and whether he has any theory for this paradoxical condition. One would expect a gain in weight.

DR. TALBOT.—This paper is interesting. Dr. Holt stated in closing that there was no way of telling about the carbohydrate. I have estimated it in a very crude manner by titrating the acidity of the stools. Assuming that the sugars are split up in disturbed digestion into a variety of acids I isolated the acetic, the lactic, and one other acid. When the digestion of carbohydrates gets beyond a certain point there is a marked increase in the acidity occurring coincidentally with diarrheal stools.

DR. KERLEY.—I would like to know since the salts are a factor in the production of tetany whether the production of a diarrhea would effect a relief of the condition.

DR. HOLT.—This paper is only a start and we may get information that will be valuable in infant feeding. I cannot answer Dr. Southworth's question. Constipated stools are almost always alkaline and loose ones acid. In reference to tetany I believe that it is true that if a diarrhea is produced there is an improvement. I induced diarrhea and found that the children lost sodium and chlorine and the question is what has this to do with tetany. Eliminating sodium and potassium relieves the nervous irritability. When we produce diarrhea in tetany we get rid of something and benefit the symptoms, and the diminution in the electrical irritability is very great.

ONE HUNDRED AND FORTY-ONE CASES OF RECURRING VOMITING IN PRIVATE PRACTICE.

DR. CHARLES GILMORE KERLEY, New York.—All cases seen in consultation and all histories in which there was any doubt as to the correctness of the diagnosis were excluded. The diagnosis was based upon definite periodic attacks of vomiting. There were 70 boys and 71 girls. The average time the cases were followed

was 104 weeks. The family history showed that in one or both parents there was rheumatism in 40, sick headache and bilious attacks in 40. The cases of recurrent vomiting occurred in the vast majority of cases in the offspring of those who for two or more generations had not been occupied with manual labor, having usually business or professional occupations. In 31 per cent. the appetite was good, in 69 per cent. poor. In 59 1/2 per cent. there was constipation. In 83 the average hemoglobin was 63 1/2 per cent. and the red blood cells were 4,280,000. The previous feeding in 120 cases showed that 21 were nursed by the mother nine months, 40 were nursed by mother six months, 69 had been difficult feeders on cow's milk and had been given the usual trial of foods. Recurrent colds had been present in 41 per cent. This information was usually volunteered. In 12 there was a definite history of eczema, 6 had the habit tic, 14 there had or had had enuresis, and in 13 there had been rheumatism. Nothing was known of the condition of the urine before coming under observation, but the presence of acetone in the later attacks was noted with very few exceptions. The onset of the vomiting occurred in 37 cases during the first year, in 24 cases during the second year, in 21 during the third year and in the others it ranged from the third to the ninth year. The duration of the interval between the attacks in 119 cases was two weeks in 22, two to four weeks in 27, four to six weeks in 10, six to twelve weeks in 42, and three to six months in 40. The severity of the attack varied widely, the child in some instances would vomit only two or three times. In others the vomiting was protracted and severe. The longest seizure observed continued thirteen days. The average interval in 118 cases was eight and one-quarter weeks. Ninety per cent. of the series and temperature during the attacks. Thirty had a temperature of 102° during the attack, 10 of 103° F, 6 of 104, and 3 of 105° F. In others there was a temperature of 100° to 102° F. The average age in 121 cases was two years and eight months. Of 41 cases followed from two to eight years after the beginning of treatment, 26 were followed from three to eight years; 15 were followed from two to three years, 15 were followed from one to two years, and 9 were followed from six months to one year. Eighteen cases had been followed less than six months and for these no claim was made. Nine cases were very much improved, the attacks being mild and comparatively infrequent. In 16 cases there was no apparent improvement. In some the treatment was carried out indifferently and in others no apparent impression was made on the disease. In the vast majority of cases the recurrence would be controlled if continued family cooperation was secured. The association of recurrent vomiting with other form of illness is interesting. As mentioned before in 41 per cent. of these cases the children were subject to repeated attacks of bronchitis, usually the spasmodic type, and not infrequently the bronchitis and vomiting occurred simultaneously. Acetone was not present in these cases unless gastric symptoms were also present. In others the attacks would be distinct and separate. In one patient there was an acute spasmodic laryngitis; bronchial asthma very urgent followed,

and this again was followed sometimes but not invariably by repeated vomiting. This child had suffered with eczema when an infant. Two boys, brothers, were of particular interest in that they had attacks simultaneously, beginning with tonsillitis, followed by bronchitis and asthma, and ending in recurrent vomiting, lasting for a day or two.

The dietetic management during the interval was the same, in the main, in all cases. If the case was a pronounced one, the patient was given a diet with few restrictions except that cow's milk, butter and sugars are omitted. One egg is allowed perhaps every third day. Saccharin is permitted as a sweetening agent. Three meals daily are allowed but nothing between meals. Red meat is given scantily three times a week. Poultry and fish are given at other times. In some cases skimmed milk is given, never more than 1 pint daily and sometimes less. Puddings are made with skimmed milk. A grave error in our management of many children is the free use of cow's milk, butter, and sugar. The period of lactation in the human is at most a year and then he is ready for other food. I believe the average well child would be far better if he were to get not more than 1 pint of milk daily after the fifteenth month. Sugar was not used except as a condiment until 300 years ago. Unknown millions lived without it. The further treatment consists in the internal use of salicylate of soda and bicarbonate of soda, independent or in combination, as devised by Rachford. In a pronounced case I give 5 gr. salicylate of soda with 10 gr. of bicarbonate of soda three times a day at five day intervals or 20 to 30 gr. of bicarbonate of soda daily for a month or two at first. This drug treatment is carried on with rest periods for months or years as the case may require. A very important factor is the daily physical exercise, such as horseback riding, the bicycle or walking so many blocks daily. A warm bath and a brisk rub at night is also given, and, last, but not least, in the treatment is the use of physical therapeutics. In severe cases I use, if possible, daily massage together with various body manipulations and exercises, the latter sufficient to cause perspiration but not to the point of exhaustion. A daily evacuation of the bowels is secured by suitable measures. I further make out a living schedule, taking some children out of school, planning a modified rest cure for others. The nervous element in these cases is not to be forgotten. The precipitation of an attack by fatigue or fright is not unusual. During the acute vomiting attack a weak solution of bicarbonate of soda is best retained in the strength of 5 gr. of bicarbonate of soda to 8 ounces hot water. This is given freely. As a laxative the magnesium preparations are best retained. When the vomiting has continued for twenty-four to thirty-six hours the patient is given colonic flushings with bicarbonate of soda 2 drams to 8 ounces at six- or eight-hour intervals. Nothing is gained by attempts at forcing the feeding. When the child asks for food he is given barley or rice gruel with dried bread, crusts or unsweetened zwieback.

Judging from the result obtained it would seem that the conclusion

of Rachford, Howland and Edsal are correct in that the chief error rests in the defective oxidation or in giving food substances of high carbon content in excess beyond the powers of normal oxidation. While not entirely convinced of Hare's theory in regard to the carbon intake and expenditure in its entirety I find it in peculiar harmony with the clinical facts under presentation, and while not forgetting that anaphylaxis and reflex neuroses from various abnormalities are still to be considered as operative causes in such affections as asthma, recurrent vomiting, migraine, etc., I wished to emphasize that eczema, spasmodic laryngitis, cyclic vomiting, and recurrent bronchitis and asthma are all notoriously frequent in children of gouty, bilious or lithemic ancestors. All these conditions are met less frequently and with diminished severity at or after the age of puberty when the processes of combustion and tissue building are at their maximum. While two or more of these so-called pathological functions are not ordinarily observed simultaneously in the same child, not a few suffer from a number of these conditions in alternation, in other words the processes seem to be mutually compensatory. In the winter when activity is lessened and perspiration is least every one of the conditions mentioned is intensified. In every instance diet is a most prominent factor influencing the susceptibility of the patient.

DISCUSSION.

DR. IRVING M. SNOW, Buffalo.—My ideas are at variance with those of Dr. Kerley. In a case of a child that was nursed and began to vomit at the age of two years the attacks steadily grew worse until at the age of six years I thought the child would die; she had profuse gastric hemorrhages and 60 to 70 per cent. acidity. In her last attack she nearly died and it was thought that she had duodenal ulcer with delayed motility. She was given cream, butter, and bacon to reduce the hyperacidity and also strong alkalis. This was a case of recurrent hyperchlorhydria and the child made a complete recovery. The gastric fluid was examined and showed that this child was benefited by fats.

DR. CHARLES HUNTER DUNN, Boston.—In a similar series of cases seen in private practice and in association with Dr. Rotch the relation to acid intoxication interested me. There seem to be two types of cases; one which includes true cases of acid intoxication; the other class those of recurrent vomiting in which with large doses of bicarbonate of soda one is not able to see the slightest benefit. I have now given up the use of bicarbonate of soda in these cases because of two cases of fatal hemorrhage which made a great impression on me. In these cases rectal feeding is important. I used to give the bicarbonate by rectum but I do not risk it now. The presence of acetone is a symptom only.

DR. FRIEDLANDER.—Martin Fischer and others who used the alkaline treatment in severe cases are now using a solution of dextrose 20 grams and sodium chloride 14 grams to the liter by rectum. The results thus far are surprisingly good; the profound exhaustion

has not appeared and the patients have rallied more promptly. The time is too short to make definite statements about this treatment but I think it ought to go on record because of the excellent results claimed for it.

DR. ISAAC A. ABT, Chicago.—The diet during the interval has no effect on the recurrence of the attack. The attacks occur about so often no matter what food is taken. The mode of life makes no difference except that such things as a nervous attack or a mild infection may bring on an attack. In the treatment of these cases 8 per cent. glucose in normal salt solution by rectum has been recommended. I give bicarbonate and ice cold chloroform water repeated frequently.

DR. P. GRIFFITH.—Curiously I came to the conclusion years ago that there were cases of recurrent vomiting that could be benefited by bicarbonate and others that could not be. Even between the attacks treatment with bicarbonate had no effect. Recurrent does not necessarily mean recurring at specific times. In my experience some patients have been benefited by an alteration of the diet and some were not helped at all. I have found nothing as good as a hypodermic of morphine; we say it stops the elimination, but it is true that it sometimes saves a life. There are cases of recurrent vomiting that look like intestinal obstruction.

DR. HEMAN.—Cyclic vomiting known by many titles may be clinically mild, moderate, or severe. It is a metabolic disturbance of fats as well as of proteids, producing acetone bodies. Measles may bring it on. The acidosis is not fatal but I have seen a case of eclampsia with a temperature of 108 °F. and no treatment could have saved the child. The moderate cases respond to bicarbonate in peppermint which acts as a mild local analgesic. One may also use bicarbonate in small amounts by the rectum, by hyperdermoclysis, or in intravenous injections. Intermittent treatment acts as a prophylactic.

DR. RUHRAH.—It seems to me we are confusing several different conditions, certain cases of crude anaphylaxis, acid intoxication from errors in diet, and other conditions, such as definite food poisoning. The proper management of the diet during the interval between the attacks does good. If the condition is due to an excess of fats, proteids, or carbohydrates, we certainly do some good by cutting out the offending substance. There are attacks due to a reflex nervous condition which recur and it is difficult to say on what these rest.

DR. HENRY L. K. SHAW, Albany.—I wish to emphasize the sudden fatality of some of these cases which give a favorable prognosis. In one case I saw the child on the second day and gave a favorable prognosis. On the third day there was a very evident acetonuria and I stopped the bicarbonate. The child died very suddenly.

DR. H. J. MASON KNOX JR., Baltimore.—In certain cases in older children where there is hyperacidity, atropine pushed to its physiological limits in connection with other means, will be found effective.

DR. WILLIAM P. NORTHRUP, New York.—Dr. Kerley has referred to a discouraging case which finally yielded to massage under a tactful and efficient nurse. In the same way I have had cases led on to complete recovery by massage after other means had failed.

DR. KERLEY.—I realize that there may be a starvation of carbohydrates and sugars, but an excess of sugar brings about just as bad results as too little. I have found physical therapeutics a most valuable adjunct in treating recalcitrant cases. These cases were not due to anaphylaxis but rather answered the description of acidosis as accepted at the present time. I do not know why the diet in the interval would not be of benefit; the great difficulty was to have it carried out.

WEIGHTS AND MEASUREMENTS OF INFANTS AND CHILDREN.

DR. ROWLAND G. FREEMAN, New York.—While believing that standard weight charts are an absolute disadvantage when given to a family there could be no question but that a physician feeding a baby should have certain standards in mind, although each baby should supply a standard of its own. While most of us have the care of a considerable number of children under good conditions where the feeding can be, at least during the first years, absolutely controlled, where the exposure to fresh air, the amount of exercise, the amount of rest, and the character of the clothing are all supervised, we have had little definite knowledge as to whether the results obtained for these children were commensurate with the care that was given them. We know in a general way that the mortality of these children is much less than that of children in general. I believe the mortality for well-cared-for babies during the first year of life to be not more than one-half of 1 per cent. but of this fact we have no definite data, but of 120 consecutive cases in private practice that I have tabulated not one died during the first year. There have been accumulated a considerable number of weights and measurements of school children in the United States, but the only data of children in private practice are those of W. Camerer (*Yahrbuch für Kinderheilkunde*, Vol. 53, 1901, p. 381. It therefore seemed of interest to make an average weight chart of 278 cases in private practice, as well as a chart showing their measurements, and in order to get definite data I measured and weighed 1000 children for comparison in the Roman Catholic orphan asylums of New York, about 500 boys and 500 girls. These institutions are situated on a high bluff overlooking the Hudson and are modern and sanitary and the children are living under very good conditions. The first chart shows the weight of the 120 well-cared-for children compared with that of institution children. It is noticed that there is considerable difference after the first month. The general average of weights taken from the different editions of Dr. Holt's book were also taken for comparison and these too fell below the well-cared-for children. The difference between breast-fed and artificially fed children was also shown. The breast-fed children showed greater

weight throughout the first nine months while the artificially fed kept fairly below. The well-cared-for children were almost all artificially fed after the first month, so that the American method of feeding children seems to compare favorably with those advocated in Germany. The second chart shows a comparison of the measurements of 120 babies represented on the first chart as compared with the measurements of 500 institution children and as compared with the average measurements as given by Dr. Holt. The behavior of these children after the first year is shown by the third and fourth charts. It is noticeable that while from the second to the fourth year the orphan asylum children average nearly as much as mine, these groups were small and most of the institution children were much older. It is an evidence of the excellent care given these children that they average a quarter to a half pound heavier than the 69,000 school children. Both of these groups from six years on are well below the well-cared-for children and at twelve years there is nearly 4 pounds difference in their weights. The last chart representing the measurements in length of the 278 well-cared-for children as compared with the 1000 orphan asylum children and the 98,000 school children shows the orphan asylum children again average somewhat taller than the school children but are well below the well-cared-for children. This shows a surprising advantage of the well-cared-for child over the others at the twelfth year of 6 inches greater in height. In conclusion I would say that the children that are under good control so far as diet, rest, and exercise are concerned show a great advantage over the data at hand concerning other children both in weight and height during the first twelve years of life, and that at the twelfth year they surpass the average by 4 pounds in weight and 6 inches in height.

DISCUSSION.

DR. SOUTHWORTH.—I shall repeat what I have said before. If we assume the average weight of a child at one year is 21 pounds (19 or 20 pounds as Chapin gives it seems smaller than the average child met with in private practice) it is because some are considerably more than 21 pounds while others weigh less. This difference in extremes depends on environment, feeding, accidents of ill health that have happened during the first year. It is most important to differentiate between breast-fed infants and those that are bottle fed at certain periods of the first year. The normal breast-fed baby grows more rapidly at first but slows down later while in the bottle-fed infant the reverse is true; it gains more rapidly during the latter part of the year. The breast-fed baby shows a tendency to relax his gain at three or four months when the maternal milk supply becomes relatively insufficient. At this time attention should be directed to the mother if the child is to keep up a maximum gain. During the last six months there is a relative insufficiency of breast milk which must be supplemented; it is therefore most important that every child should be carefully supervised during the first year

of life as it is thereby possible to keep him gaining rapidly since by such supervision one can add to the food when there is a tendency to fall below the proper weight. Avoidance of infectious colds during the first year is important since they may cause the delicate child to stand still.

DR. PISEK.—The lack of accurate figures for weight and height of children between the ages of two and five years is to be deplored. I have looked forward to the time when this Society would adopt resolutions requesting each member to contribute a series of measurements of children in his private practice. There should be such a collective investigation by the Society.

DR. SHAW.—I agree with Dr. Pisek, but in New York State every physician who examines a school child under the new law has to fill out a blank showing the weight and measurements he has taken himself. There are more than 98,000 children from which to draw an average. There is a standard score card issued by the American Medical Association's better babies' contests. There are between fifty and sixty score cards in existence and the Women's Public Health Committee has devised this one. If we do not take the form adopted by the Smithsonian Institute we might use this one as it provides for full measurements and is easy to correlate.

DR. PISEK.—We could not accept the statistics of New York City as the measures have been indiscriminately made. The figures we would want must be based on an absolute standard like that of the Smithsonian Institute.

DR. FREEMAN.—I would like to point out one fact in regard to the normal weights during the first year. The average gain during the first three months is five pounds; during the second three months three and one-half pounds; during the third three months three pounds and during the fourth three months, two pounds.

DISEASES CONNECTED WITH MECKEL'S DIVERTICULUM, WITH SPECIAL REFERENCE TO DIVERTICULITIS.

DR. J. P. CROZER GRIFFITH, Philadelphia.—There occurred in my practice not long ago a case in which the combination of clinical manifestations was so unusual, so unexpected, and so misleading that it seems worthy of being recorded. This patient was a child of nineteen months, who after slight indigestion, began to suffer from an increasing anemia, and on one occasion from suppression of urine. There was a history of some reddish colored stools. The condition of the stools continued with increasing anemia and abdominal pain, gradually becoming very severe with tympanites. Rectal and abdominal examination showed nothing abnormal. The final clinical diagnosis as that of secondary hemorrhage depending on hemorrhage somewhere in the intestinal tract. During the attack there had been a moderate irregular febrile reaction.

“On opening the abdomen a localized peritonitis was seen just below the umbilicus. This localized peritonitis could have been placed in a circle having a diameter of 8 cm. In this area four

coils of intestine were firmly matted together, and the serous coat of the bowel showed a fibrinous peritonitis. When the coils were forcibly separated an abscess was discovered which contained a little more than 2 drams of pus. Further dissection allowed the pus to escape and revealed a Meckel's diverticulum in the center of the abscess-cavity. The diverticulum measured 3 cm. in length, and its walls were quite thick, averaging about 8 mm., but thinner at the tip. It was firm on palpation, giving the sensation characteristic of a chronic inflammatory process. The mucosa of the diverticulum was swollen and eroded, and at the tip of the organ there was found an ulcer 8 mm. in diameter. The opening between the ileum and the diverticulum was small but patulous. The distal extremity of the diverticulum was free. There was a purulent exudate at its tip on the serous surface, corresponding in location to the ulcer on the mucous surface. The remainder of the intestine, including the appendix vermiformis appeared normal. The mesenteric glands were somewhat enlarged but without evidence of suppuration. The liver was normal in size but yellowish in color, showing a fatty infiltration. There were no metastatic abscesses discovered. The spleen was normal. The kidneys showed an acute diffuse nephritis. They were moderately enlarged and red in color, with a wide cortex containing reddish streaks."

We have here probably primary ulcerative inflammation of Meckel's diverticulum which was the cause of the persistent leaking of blood from the bowel, and of the severe anemia. This inflammation extended to the serous layer of the diverticulum, producing a secondary purulent peritonitis, localized by the matting of the coils of the ileum around the seat of suppuration. The severe abdominal pain was due to this peritonitis, and in part, perhaps, to the kinking of the intestine, making evacuations of the bowel difficult, and accounting for the constipation. The origin and bearing of the nephritis was uncertain. It appeared to have little part in the complex of symptoms and the fatal termination.

None of the affections of Meckel's diverticulum appear to be of common occurrence, although a persistence of the organ in some form is found in 1 to 2 per cent. of all persons. Lesion of Meckel's diverticulum seem oftenest to produce symptoms in adult life. Among the lesions of Meckel's diverticulum is strangulation of the intestine by the diverticulum or its remains, the persistence of Meckel's diverticulum with an opening at the umbilicus, the formation of cystic tumor, concretions, a superinvolution of the diverticulum, stenosis of the ileum caused by traction of a short diverticulum attached at its distal extremity or elsewhere, invagination of the diverticulum, volvulus of the diverticulum, hernia of the diverticulum, inflammation of Meckel's diverticulum, of which the case reported is illustrative. The causes of diverticulitis are obscure; that pathology is analogous to that of appendicitis. The diagnostic features may be summarized as follows: 1. Localization of pain and tenderness not so often at McBurney's point as somewhere higher and to the right of the umbilicus, or even about it, or in some

different region. 2. An area of puffiness or firm resistance in this region. Absence of slight degree of meteorism, at least early in the attack. 4. The presence of blood in the stools and in the vomited matter. 5. The earlier existence of an umbilical fistula, or of some malformation somewhere else in the body. The lesion has never been correctly diagnosed during life.

THE NEW SARAH MORRIS CHILDREN'S HOSPITAL OF CHICAGO.

DR. ISAAC A. ABT, Chicago, gave a lantern slide exhibition showing the ground plans of the different floors of this institution and the features of special interest. The institution accommodates 125 patients and cost \$250,000. One of the features was that the hospital was so planned that in case of an epidemic one portion could be entirely closed off from the remainder of the building. Plates are used for giving the babies their baths and an automatic recorder registers graphically the exact temperature of every bath so that the records are available for the head nurse or the physician.

ON THE ARTIFICIAL COOLING OF SICK ROOMS IN SUMMER. A PRELIMINARY REPORT.

DR. HENRY HERMAN, New York.—This article is based on an experiment in the artificial cooling of the children's ward for enteritis in Dr. Koplík's service at Mount Sinai Hospital, New York City. The etiology of gastroenteritis has been much discussed and in our opinion it is a nutritional disturbance having a secondary bacillary basis which accounts for its marked prevalence when there is extreme heat. The temperature of this room ranged from 63 to 74 and lower except on one day. It remained at 69 degrees for forty-two days and was at all times from five to eleven degrees below the outside air. The relative humidity was very much the same as that of the outside air but the absolute humidity was diminished by the cooling. Thirteen selected patients with gastroenteritis were placed in this room and the treatment given them was no different from that of any ordinary case of enteritis. They were fed *Eisweisse Milch*, barley, etc. Gastroenteritis was not particularly prevalent during the past summer and the number was below the usual one. There was no opportunity to compare a number of cases in the open wards. While it is too soon to draw conclusions, we have gained the impression that in this ward the children were more comfortable, cried less and looked less sick and parched. We do not wish to belittle the other methods of treatment used on these children but we wish to introduce another method as a help. This method is not applicable to moribund, premature infants, but it is suitable for all others.

DR. HEINMAN showed lantern slides illustrating the apparatus and the method of cooling.

DR. NORTHRUP.—Were there any febrile diseases treated besides gastrointestinal disturbances?

DR. BOWDITCH.—I would like to point out one of the pitfalls in connection with an apparatus of this kind. One of the best things about this apparatus is the short ducts which prevent the collection of dust. In Boston we have a similar plant installed at great expense but the fan was a long way off from the coil room and as a consequence the ducts all became clogged with dust. A series of apparatus placed near the wards would be better than a central plant a long way from the ward.

DR. TALBOT.—Dr. Bowditch forgot to say that we tried to start the apparatus one day and 75 per cent. of the children and all the nurses in the ward got infectious colds.

DR. B. S. VEEDER, St. Louis.—We have one room which has refrigerating pipes all along one side so that the room is cooled without the cold air coming into the room.

DR. ADAMS.—In Washington I had a boy sick in a private house and the temperature was about 90° F. By means of an electric fan I got a course of air over a large cake of ice and kept the temperature down to 75 or 80 F. Care was taken that the current of air did not strike the patient. The mother feared it was not good for him and when the temperature was allowed to rise the boy went into coma. It was finally decided to take him to New York and when he got to an elevation the effect was very beneficial and striking.

DR. SHAW.—At St. Margaret's Hospital we have a cooling plant that cost about five dollars and consists of a pipe rigged up to drip on a sheet.

PRIMARY SPLENOMEGALY IN AN INFANT.

DR. J. H. MASON KNOX, JR., and DR. R. H. WAHL, Baltimore, reported this case which occurred in an infant eleven months old. The child had never thrived and weighed eleven pounds. There was general malnutrition associated with idiopathic enlargement of the spleen, liver and lymph glands, and a peculiar yellowish pigmentation of the skin of the exposed parts. The blood picture was normal until a few days before death when it assumed the appearance characteristic of lymphatic leukemia. At autopsy the liver, spleen, and the lymphoid tissues were very much enlarged and firm. Histologically, there was more or less complete disappearance of the lymphoid elements which were largely replaced by large swollen, rounded or polygonal cells with small nuclei and abundant foamy appearing cytoplasm. The affected organs showed a variable amount of iron containing pigment. In this case the large cells apparently arose from both the endothelium and from the reticulum. The picture in the spleen resembled that first described by Gaucher in 1882. The condition suggested a systemic disease of the lymphatico-hemopoietic tissues, but apparently any reticulated tissue might be involved. The condition was probably very closely related to other blood diseases.

A CASE OF GAUCHER'S DISEASE—SPLENECTOMY AND RECOVERY.

DR. CHARLES HERRMAN, New York.—This is the second case that has come under my personal observation. The first was a boy three and one-half years of age who came to my service in 1911. The clinical history of the case was reported by Dr. Reubens in the *American Journal of Diseases of Children* in 1912, vol. iii, p. 28. A splenectomy was performed by Dr. Weiner. The patient died shortly after and the pathological history was reported by Dr. Mandelbaum.

This case occurred in a boy fourteen years of age. His mother is healthy; his father has had gastric ulcer for which a gastroenterostomy was performed. Eight other children all appeared healthy but one sister seven years of age who has a tuberculous coxitis, and an enlarged spleen. These two children affected were the last in a large family. The patient came under observation in 1906 at the age of seven years. The mother had noticed the enlargement at the age of four years. At the age of six and one-half years the patient had severe pain and epistaxis. There was a moderate enlargement of the liver, but no distinct enlargement of the lymph nodes. The face was discolored especially around the nose and there was a wedge-shaped thickening of the cornea. The leucopenia was persistent. The size of the liver and spleen did not change materially during the seven years that the patient was under observation. As the disease progressed the blood showed a marked decrease in the percentage of hemoglobin (75-45), a slight decrease in the number of red blood cells (4,390,000-3,400,000), a constant leucopenia with a decrease in the percentage of polynuclear leucocytes (70-40). As a result of the operation besides a marked improvement in the general condition there was an increase in hemoglobin (40-55) and red-blood cells (3,400,000-4,000,000) and a much more marked increase in the white blood cells (4,1400-15,000), with an increase in the polymorphonuclear leucocytes (48-75). All forms of drug treatment were used in this case before resorting to splenectomy.

SHALL A DEPARTMENT OF PEDIATRICS INCLUDE IN ITS CURRICULUM THE
THEORETICAL AND PRACTICAL TRAINING OF MEDICAL STUDENTS
IN SOCIAL-MEDICAL WORK AMONG INFANTS AND CHILDREN?

DR. HENRY J. GERSTEMBERGER, Cleveland.—Dr. Gittings in his paper on a similar subject last year said, "Between the prevention of disease and the preservation of health there is no essential difference and surely the physician and not the sociologist should become the logical arbiter of all problems relating to health. If we are willing to take this first step then we must be ready to take the second, namely, see that the "logical arbiter" is adequately trained and prepared for his work, especially when we are aware that the future welfare and development of the medical profession and its importance in the eyes of the public at large depend more upon the manner and thoroughness in which medical men are trained in this work than upon any other one factor. The faculties of medical colleges do not

to-day realize that for the prevention of disease and the preservation of health and for the welfare of the profession it is essential that medical men train themselves in this important field. Some feel that social medicine is beneath their dignity and that social work belongs to the layman. The first requisite for any work is that it should be built on the solid foundation of the scientific facts of the day. Much work even when based on as good cooperation as can be secured is a sham, a waste of time, a synonym for superficiality and cannot be compared with the result, although that result may never be announced with trumpets and bells, that will obtain by work based upon facts and truths, even though it lack cooperation. As illustrations of some of the misdirected social work is the overfeeding of tuberculous patients with milk and eggs, and the distribution of certified milk.

There is no field of medicine to-day which gives greater opportunities for the successful application of preventive medicine than that which deals with infancy and childhood. Not only do the infant and the child point more clearly to the dangers that beset mankind than adults do, but they at the same time give us the opportunity to improve the health and strength of the future nation. The widest application of preventive medicine will sooner or later be accomplished through the States, especially through municipal board of health, the centers of practical work. Around the Division of Child Hygiene the remainder of the Health Department work must be built up. Thus in tuberculosis work they have come to realize that next to the prevention of tuberculosis the prophylactic work for babies is important. Children's dispensaries to prevent illness and death among infants and children do more to prevent tuberculosis than any other one activity. It is a mistake to group further work around tuberculosis departments. This is only one disease while the work among children fights all diseases and harmful influences. The ideal scheme for the practical application of preventive medicine in public health work would be one dispensary in a small district with a well-trained full-time physician in charge aided by an adequate nursing staff and social worker, and medical assistants to care for all medical and social ills of the people in his district, except obstetrical and postpartum cases. This physician should have as his administrative head the Commissioner of Health, and as his vigilant advisors and counsellors for the different parts of his work men at home in their special fields of medicine. These same men to be the heads of their respective departments or subdepartments of the university medical school or some one of the university staff appointed by such head for the simple reason that after all is said and done our greatest hope for completeness of knowledge, for ideals, and for stable policies in medical education in America are the universities. This would give the student the opportunity to get into touch with practical work. Those in charge of the pediatric department have a great duty to perform in at least opening the eyes of the future medical men to the vast field that lies in this direction. They could thus

teach the importance of pediatrics as the broadest type of internal medicine applied to the most sensitive and most easily influenced group of human beings, the infant and the child, and it is therefore second to no other department in its opportunity for valuable work. It merits from the councils of medical faculties the same recognition given to general medicine, surgery obstetrics, and the laboratory departments.

This plan is being followed in Cleveland. During the senior year the class is divided into four sections and each section spends one and one-half to two hours for eight consecutive weeks in the wards. He gets an experience in the contagious wards of the Children's Hospital, hears ward talks in the hospital, becomes acquainted with practical milk work in the milk laboratory of Babies' Dispensary and becomes familiar with the practical work in the prevention of sickness and death among infants and children by visits to the homes and by contact with the families and their surroundings. He becomes familiar with the ideals and method of operation of charitable, philanthropic, religious, and municipal agencies that may be used in improving conditions of infants. This work is appreciated by the men and we are convinced that the seed has been sown and that it is recognized that all public health work and social medical work must be based on scientific medicine. The ideal plan embodies, first the solid foundation of scientific facts; second, the practical training that permits the individual to best apply these facts especially in the prevention of sickness and death; third, the co-operation that brings harmony into the work and prevents wasteful reduplication.

DR. CHAPIN.—Hospital and institutional work is of little value unless it takes into account the ultimate condition of the child and then it becomes highly useful and valuable. Institutional work is different from home work and many an interne who makes a very good record is unable to adjust himself to life in the poor home and if the university could give the time to instruct the men in work in the homes it would be of great value, but under present conditions the university does not now have the time. The most crying evil of the day is that men are turned out with insufficient training. With reference to active social service the first step was made in 1900 in the Children's Hospital when the social service work was started. Every home is now visited and the physicians know the conditions surrounding the child in the home. In the future this work will loom up greater and greater. In order to avoid the danger attendant on misdirected efforts of the emotional and untrained this work should be in the hands of the physician who not only oversees it but carries it out. We began the work with women physicians but for some unknown reason they did not seem to do as well as nurses and we have been employing nurses. The work seems to require a peculiar personality. They must have tenderness and be something more than trained technicians.

DR. BLACKADER.—Whether this ideal can be realized in teaching is a question. At McGill we now have five year's work and the fifth

year is devoted to clinical work in the hospitals at first combined with didactic teaching. Now one morning a week during this last year was given to pediatrics. The laboratory takes time and other branches take time and it is our endeavor to equip men to go out as well trained as possible for general work and where is the time to add social work? We must give this as a postgraduate course. A great deal of this social work should be done by the physician, who can do a great deal of it under a pediatric head. I am glad Dr. Gersterberg spoke of the useless feeding in tuberculosis and the needless giving of certified milk. Some years ago we suggested these things and now we turn them down.

DR. HOLT.—The outlook is not as bad as has been pictured. The subject of pediatrics is getting more time than it used to get. Pediatrics gets as much time as obstetrics and generally speaking it is being recognized more and more all over the country. We have just heard from Cleveland and St. Louis Harvard, and Columbia and they do not neglect this branch of medicine. The men at Columbia get a pretty thorough knowledge of what pediatrics means and the work is not optional, but must be taken for a degree. What was said in regard to the relation of the physician to social work was about right. The physician and the pediatricist have held aloof, but the amount of work they do makes it impossible in many instances for them to take an active part but they ought to give the work their influence and support. The Association for the Prevention of Infant Mortality invites medical men to take part and blames them for not doing what they can in this work. The student must have his introduction to do this work before he is out and is taken up with other things.

DR. TALBOT.—In the Massachusetts General Hospital we have a well-equipped social service department and we feel that we could not get along without it. The criticism is often made that medical men will not take the responsibility that social work would impose.

DR. CHAPIN.—With the endless multiplication of agencies one cannot find time to take an interest in all of them. I do not see why we should have more societies.

DR. KNOX.—I wish to endorse what Dr. Gerstenberger has said. If people had waited for this Society to become active, many babies would have been lost. While the people are interested in this work, they look to the members of this society to take part; the work cannot all be done by pediatricists but they should interest all, and everyone should work who loves the baby. The pediatricist can direct where he cannot do the work. Infant consultations would furnish another opportunity for the student. Here he would see the babies that come week after week for advice as to how to keep well. The student will thus get interested in the work of prevention and will go out with the knowledge of how to keep babies well, as well as how to cure them after they become ill.

DR. MORSE.—One thing which Dr. Rotch did was to introduce a course on preventive pediatrics in the fourth year which was elective, a month at a time, and they found that the method was not very

satisfactory and were now planning to put the fourth year men in the baby hygiene stations. In the new hygiene department they gave a course of lectures and the students were taken to the hygiene stations two or three afternoons. There is not sufficient correlation between the different agencies engaged in the work of looking after children and in the prevention of infant mortality.

DR. GITTINGS.—From the present indications we will soon be on the Chinese basis. I wish to emphasize how strongly I feel on this subject. The physician with a well-established practice cannot do more than expend his sympathy. It is necessary to have trained directors and I think now that the seed has been implanted in the minds of the students, men will qualify.

PATHOGENESIS AND PROPHYLAXIS OF RICKETS.

DR. FREEMAN.—It seems to me it is time we stop considering rachitis as a disease due to food at all. Food never causes it though it may modify the course of the disease. Some of the worst cases I have seen have been babies on good breast milk. Rickets usually occurs in people from the tropics and develops only during the winter when the children are shut up. It seems to me that rickets is a disease due to bad air.

DR. HOLT.—I have been interested in a comparison of breast milks and have examined a series as to the salt content. It takes a large amount of breast milk to determine the amount of salts. To get this required amount we either took small amounts from a number of women or took it from one woman for a longer period. One quart is necessary for the experiment. Everything goes to show that the salts are not deficient during the latter months of lactation. The salt content of the later months does not differ from that of the second, third, or fourth month.

DR. ABT.—How does the essayist reconcile what he has said with our previous views in regard to phosphorus and magnesium metabolism. What rôle do the internal secretions play in the production of rickets? How does he explain rickets in babies fed on breast milk?

DR. LA FETRA.—There is another class of cases occurring in young and feeble and especially in premature babies that have had the best feeding and hygiene. Something seems to have influenced them before birth that produces a tendency to rickets. It is a question whether the food factor or even fresh air enter into the problem. There may be something in the internal secretion that is responsible.

DR. P. GRIFFITH.—There seems to be a tendency to rickets in the colored race and in Italians. The condition has been observed in stillborn infants and there seems to be a hereditary factor. This has been studied by an Italian physician with reference to the past histories of families. He found that even with the best feeding and care children with this inherited tendency would develop rickets. While they felt sure that there was something inherited they could not say what it was.

DR. TALBOT.—With the help of a social worker I have studied 100 cases of rickets from every point of view and after we were through I could find no definite cause for the disease.

DR. WINTERS, New York.—There may be an inherited factor and there is no reason why there may not be congenital rickets, but the underlying causes are those I have spoken of, the diminution of proteids and salts. As to the cases of rickets in colored and Italian children one cannot be sure that they are not due to bad feeding as without the help of a social worker it is impossible to get at the truth regarding the feeding from the mother. If it is wholly a question of atmospheric conditions such cases as Dr. Gittings has spoken of would not arise. Hygiene might be a predisposing factor but it does not play an important rôle or else one would not see strong healthy young mothers with healthy babies who had been living in dark cellars. The fact that children who develop rickets on the foods that I have indicated and get over it when put on the breast is evidence that other factors are subordinate to those involved in the feeding.

SOME RESULTS OF THYMUS EXTIRPATION.

DR. JOHN HOWLAND, DR. E. A. PARK AND DR. R. D. McCLURE.—Extensive recent work by Matti, Klose and Vogt have shown that extirpation of the thymus gland in young dogs gives rise to emaciation and death several months afterward. Their work shows further that most pronounced changes in the skeleton take place, changes identical with those of rickets in the human being. Von Basch and others have found as a result of thymectomy in dogs transitory changes in the skeleton resembling human rickets, but have failed to find that the thymus gland is essential to life. The results of our experiments thus far fail to show that the thymus gland is essential to life. Some of our thymectomized animals have shown retardation in the development of such extent that at the end of six months they were not much more than one-half the size of the controls, but are nevertheless active healthy looking normally formed animals. No changes of a rachitic nature have been found. We feel certain in the belief that the thymus gland in dogs is not essential to life and that the changes which result from its removal are not of so gross a nature as has been reported in recent work, which has come particularly from Germany.

DISCUSSION.

DR. FRIEDLANDER.—It is difficult to extirpate the thymus completely for in certain instances there are accessory thymi and these easily regenerate and take the place of the original thymus and they affect the results of these experiments. Thymectomy in the human being is exceedingly dangerous and there is no absolute indication for doing it. By the operative method the mortality has been shown to be 33 per cent., while the method of shrinking the thymus with the x-ray has proved simple and safe, there being but one death

among the twenty-seven cases. We are justified in claiming that in the *x*-ray we have a means of treating enlarged thymi just as effective and much safer than thymectomy.

DR. ABT.—What is a large thymus, one that produces symptoms or one that appears large by examination with the *x*-ray? I am convinced that the diagnosis by the *x*-ray alone is not sure. If one can outline the thymus by percussion and there are associated symptoms which are confirmed by the *x*-ray picture we may feel justified by making a diagnosis of enlarged thymus. The only place where the *x*-ray can be absolutely relied on is in the cap thymus; in other forms of enlargement the clinical evidence is more sure and the *x*-ray only confirmatory.

DR. PARK.—In regard to the difficulty of completely extirpating the thymus, we have looked for these rests and believe their presence has been greatly exaggerated as we have not found them. As to the operative removal of the thymus, this ought not to be so difficult; of course one cannot remove it entirely without entering the thorax. As performed by Dr. Halstead the operation is simple and ought not to be attended with great danger.

THE DIAGNOSIS AND TREATMENT OF THE LATE TYPE OF HEREDITARY SYPHILIS.

DR. BORDEN S. VEEDER and DR. R. C. JEANS, St. Louis.—During the past two years we have seen 122 cases of hereditary lues at the St. Louis Children's Hospital. Of these 74, or 60 per cent., belonged to the group usually described as late syphilis, while only 48, or 40 per cent. were infants under one year of age with the classical symptoms of rash, coryza, enlarged spleen, etc., which belong to the early stage of hereditary syphilis. This ratio was the reverse of the figures usually given of early and late hereditary syphilis and was due to the inclusion of cases which were not looked upon as luetic before the frequent use of the Wassermann reaction. In only twelve of the cases were we able to obtain a positive history of early lesion in infancy, while in twenty-five cases the history was definitely negative regarding this point. In the remaining twenty-seven the history was uncertain and indefinite. Blackfan and Nicholson who tested the blood of 101 infants in St. Louis, thirty-three of whom were from our clinic and who showed no physical signs of lues, obtained a negative reaction in ninety-eight cases, a doubtful one once and a positive one once. There was a wide variety of lesion encountered, and in many cases the lesions were multiple. In every case in which these lesions occurred the Wassermann was positive. The large number of our cases with lesions of the central nervous system, 43 per cent., was one of the most interesting things in connection with this series from the standpoint of diagnosis. Among the unusual lesions were an aortitis and a torticollis. Three cases were tested for indefinite pain of obscure origin which had persisted irregularly for some time and all gave positive reactions and the pain disappeared under specific treatment.

The absence of Hutchinson's teeth in our series was very noticeable. In forty-eight cases old enough to have permanent incisors the teeth were notched in but three instances. So many cases have given positive Wassermann reactions that we now make it a routine practice to examine all cases with chronic lesions of the central nervous system and many acute cases. Likewise cases with acute joint lesions and those frequently looked upon as rheumatic the Wassermann test was made. We believe that the routine Wassermann reaction will explain the basis of many clinical conditions of obscure etiology met with in children. The treatment we have involved consists of a combination of neosalvarsan and mercury. We prefer the neosalvarsan because of the simplicity of the technic. The neosalvarsan was dissolved in 1 c.c. of freshly distilled water for each decigram and injected intravenously into any available vein with a record syringe. They had given up the muscular injections because of the pain and discomfort and the objections of the parents. The dose varied according to the age and the clinical condition of the patient. We have found neosalvarsan fulfills the requirements in children and is effective. For the treatment of acute lesions the neosalvarsan is far more effective than injections of mercury. The gray powder can be given over long periods of time with less disturbance than mercury in any other form. We have had no experience with mercurial injections.

The course of the treatment in acute lesions varies but is generally as follows: Three or four intravenous injections of neosalvarsan are given with a gradual increasing dosage. Then the mercury is started in small doses which are regularly increased until the patient is taking fairly large doses. In a few weeks this is interrupted for a short time and then started again. In a number of cases a second series of injections was given. As the cases differed so much a number were reviewed in illustration of the method. We have given some 200 intravenous injections of neosalvarsan and have never noticed any bad or unpleasant effects except nausea and vomiting in a few instances. There could be no question as to the value of neosalvarsan in acute lesions with the exception of interstitial keratitis. In the acute joint lesions ulcerations, general convulsions, torti collis, etc., the effect seemed to immediately follow the first intravenous injection. They had been able to secure but little permanent effect from neosalvarsan nor had they observed any advantage from its use in chronic cases of the late type, that was where there were such lesions as cerebrospinal syphilis, or interstitial keratitis which has been present for some time. The most intensive treatment with combined neosalvarsan and mercury had been of little avail in these cases. The Wassermann reaction was stronger in hereditary lues than in any other form of syphilis and hence was correspondingly more difficult to make negative. It was apt to become positive if treatment was stopped when it had been negative as the result of treatment. No case could be looked upon as cured until a negative Wassermann had been obtained and remained negative without treatment for some time.

DR. KERLEY.—It is very comforting to hear what has been said in regard to the effect of the treatment in the late cases. In three cases coming under my observation, one of keratitis, one of periostitis of the tibia and the third having both keratitis and bone changes there was no effect from the combined use of salvarsan and mercury and I thought that perhaps I did not know how to use the treatment.

DR. HAMILL.—Dr. Warthin has been studying the question of the persistence of the spirochete in cases of cured syphilis which had given a negative Wassermann for several years. In such cases coming to autopsy he has found the spirochete in the testicle in nearly every instance, and he draws the deduction that syphilis is probably an incurable condition. He was asked the question "In cured cases that become reinfected, if the spirochete persist what relation these spirochete have to the new infection?" This is interesting in connection with Dr. Veeder's point that one could not feel sure of a definite cure in these late cases.

BRIEF OF CURRENT LITERATURE.

DISEASES OF CHILDREN.

Treatment of Vomiting in Infants and Athrepsia by Large Doses of Sugar.—P. Nobécourt (*Arch. de méd. des enf.*, May, 1914) gives histories of two infants treated by him by raising the quantity of sugar used in feedings. One child vomited the breast milk, the other was becoming emaciated on the feeding of diluted milk received. Enough sugar (saccharose) was added to bring up the number of calories. The author recommends adding about 10 per cent. of sugar to each feeding. The vomiting ceased within twenty-four hours. Increase of sugar has also been found to assist in treatment of the vomiting of ulcer of the stomach. We do not at present entirely understand the effects of the sugar, but the author believes that it is the result of increased nutrition. Sugar is an important addition to the diet of a child normally. The digestive tube changes the sugar of milk and utilizes the glucose formed. The child's organism is particularly able to utilize sugar, and any form of sugar may be used. In many cases of gastrointestinal troubles there are indications for the addition of sugar to the ration. One of the chief causes of cachexias is improper feeding. The most common symptom is emaciation. By reason of the comparatively large surface of the skin in the child the radiation of heat is great, and there must be a source of supply of new heat. Sugars and fats are the two sources of this supply. If the process goes too far the muscle substance itself is burned up and destroyed, and finally death results. Increase in the amount of milk given will not supply the deficiency of nutrition, and the best addition is sugar which immediately supplies heat and fat to the body. Lactose is a laxative when thus used. The

simplest explanation of the increase in nutrition is that the increased formation of energy is its cause.

Sugar Metabolism in Lymphatism.—Hans Schorokauer (*Jahrb. f. Kinderheil*, 79, Bd. xxv, H. 5, 1914) says that disturbances of the internal secretions play an important rôle in the causation of so-called lymphatism. Here there are especial disturbance of the metabolism of sugars, with failure of action of pancreas, liver, suprarenal, spleen and hypophysis on the carbohydrates, affecting the animal organism. Hirschfeld couples the adrenalin content of the blood with the exudative diathesis. The author investigated the metabolism of sugars in a group of lymphatic children. Among these were children showing enlarged tonsils, adenoids, and enlarged glands in the neck. Syphilis and gonorrhœa were excluded by tests. To these children a large amount of dextrose was administered daily in warm water. Some of the others took galactose. The successful experiments were limited in number because of the vomiting caused in several cases by the administration of the sugar. Only nine of the children were successfully treated and examined. The urine was punctured one hour after the sugar was ingested. It was found that the increase of sugar in the urine occurred at the end of one hour. In all cases the sugar content of the blood was increased by the administration of the sugar. The question now arises, whether there is a diathetic condition in lymphatic children, and whether the symptoms of enlarged adenoids and tonsils, fatness, and pallor found in lymphatism are due to failure of the metabolism of sugar. The author believes that his results with reference to sugar show this to be the case, and that changes in the metabolism due to weakened function of the adrenal system is shown by the increased sugar content of the blood.

Diagnosis of Tuberculosis in Children.—Answering the question "Under what conditions is the diagnosis of 'tuberculosis' in childhood justified?" and meaning clinical tuberculous disease which presents a definite picture and which requires definite treatment. J. B. Hawes, 2d. (*Bost. Med. and Surg. Jour.*, 1914, clxx, 784) says that in the absence of advanced tuberculosis or a recent infection with some acute disease which might cause a negative reaction, a diagnosis of tuberculosis is rarely justified unless there is a positive skin tuberculin reaction. If constitutional signs and symptoms are absent, a definite diagnosis is unwise, although this should not interfere with placing the child under proper treatment. Signs referred to the chest and lungs are of interest and value, if present; if absent, their absence should not preclude a definite diagnosis. If present without constitutional disturbance, look out for chronic influenza and pneumococcus infections. Positive *x*-ray evidence is of value in conjunction with other evidence. Diagnoses based on the *x*-ray alone are apt to be wrong, and are unjust to the patient.

Causes of Lateral Curvature of the Spine and Their Relation to Treatment.—Z. B. Adams (*Bost. Med. and Surg. Jour.*, 1914, clxx, 786) states that a careful *x*-ray study in each case is indispensable before treatment. Fourteen of his twenty-two cases showed a congenital lesion at the lumbosacral junction.

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ORIGINAL COMMUNICATIONS

THE NEW "EFFICIENCY" SYSTEMS AND THEIR
BEARING ON GYNECOLOGICAL DIAGNOSIS.*

BY

ROBERT L. DICKINSON, M. D., F. A. C. S.

Summary.—Should the methods of Taylor's "Scientific Management" prove adaptable to health factories, as for example, in dispensary, and hospital, and office group diagnosis, then responsibilities would be recast by "function;" processes would be standardized and reduced to writing; instruction carried throughout; inspection check up everyone's results; and the whole be preceded and constantly accompanied by detail studies of time and waste motion and fatigue. An outline of an interview with Mr. Frank B. Gilbreth is given, with a chart of functions. Suggested standards are listed and examples of printed forms submitted, such as a full preliminary history to be made out by the patient herself, and directions to gravida and women at forty. Reference is made to cooperative methods as instanced in the Associated Out-patient Clinics of New York; in the plans of the Hospital Efficiency Committee of the Philadelphia County Medical Society representing fifty-five hospitals; in the great Mayo building just opened; and in associations of doctors in groups in cities great and small.

As far as part of our manufacturing goes—the turning out of a high average in our primary or basic product, a diagnosis—the work is still in the home industry or village stage. In the Bavarian Highlands the household undertakes the manufacture of one part of a

* Read at the Boston meeting of the American Gynecological Society, May 20, 1914.

toy and the next part is done down the street. In simple articles this is effective, individual, of low cost, and may be better than the output of the cheap factory. The best of it, the artist-craftsman's work, brings satisfaction only, however, when one can afford to disregard the relatively high cost of such necessarily slow production. In like manner the fully equipped clinician who is at home in laboratory technic may, for instance, run over his blood, urine, feces, sputum, eye-ground, reflexes, and fluoroscope screen and check up conclusions, especially in a puzzling problem. But this high-priced labor cannot do routine *diener* work, neither cut sections, nor develop plates, and if one man did handle all detail he yet could not dispense with the need for an average complete diagnosis of two or three well-qualified specialists. Even though he find the cause of the pain, and rest satisfied with relieving it, he cannot say that it is the only contributing cause or that there is nothing else the matter, unless his patient is fully overhauled. When my motor goes into the shop to be partly taken down for a fault I don't want other defects to be overlooked.

If our office diagnosis, then, may be said still to represent the-home-above-the-shop period, because of the absence of organized every-case cooperation, most dispensaries may not unfairly be called cheap factories, as far as thoroughness and highly finished product is concerned. We have profound regard for the finest of these institutions and for the weary years of devoted work of those who serve in all of them. We could hardly put forth better results under present conditions. It is not that the labor is underpaid. It is unpaid. The apprentice work of the young doctor is not only junior work, but it is the labor of the partly trained craftsman with rarely the master workman (professor or chief) to drill him, and with no inspector going the rounds to check up results regularly. The tools in this workshop have been known to be discards from the operating rooms above, and the light of a basement must often suffice. In other words, neither state, nor city, nor private patient, as the run of these goes, appreciates the complexity, or thinks he need pay for, a complete diagnosis. Yet treatment is dovetailed with diagnosis in all these matters and rises or falls down with it.

What is the remedy? Cooperation. The brighter side of the picture shows it.

There are four agencies outfitted for real diagnosis.

First, the well-equipped hospitals and dispensaries of the leading medical colleges. As compared with these the very best hospitals not connected with teaching institutions cannot do thorough work

even though provided with a full staff of specialists. Attendance in free wards is a gift of time by busy men who have to steal it from the needs of earning a living. It cannot, therefore, be their first business in life nor yield a high grade product of anything like uniform excellence. In a lesser degree this holds good of dispensaries.

Second, a well-organized clinic like that in Rochester.

Third, the team play in those smaller towns where the medical men have studied the need, allotted their several parts, sent the different members of the group each to train in his own line—and meanwhile conserved his practice for him.

Fourth, group diagnosis by an association of men in the various lines of medical work, in a building adapted for the purpose. This may be in hospital, office structure, or dispensary. In some institutions, like the Johns Hopkins and the Peter Bent Brigham, members of the staff send in patients who can pay but a moderate fee to stay for a few days, and the staff is turned loose on them for careful study. Any dispensary might use some of the hours when the plant is lying idle and run it for the neglected class—the self-respecting people of small incomes. It is an axiom that the poor get a degree of group diagnosis in dispensaries, while the rich get it by reference from one specialist to another, but the "backbone of the nation" is badly off in its wandering from practitioner to practitioner. A plural diagnosis for a moderate fee in a dispensary put to use in empty hours need not cause an outcry that patients are being stolen from the family doctor if the provision is made that only referred cases will be accepted. Anyway some such action is inevitable.

In speaking of a group in an office building I do not refer to such a development as that on Chicago's finest avenue. The famous and able men there have facilities on a floor of this handsome edifice for little more than taking histories and distributing patients to hospitals. On a recent visit there no *x*-ray or fluoroscope outfit or laboratory or surgical dressing room or examining room worthy the name were to be seen. A gynecologist of big fees had not even an office nurse. Two men divided a little office or even a single desk. It looks like medicine as commerce raised to the *n*th power. Or else such offices frankly give up diagnosis and send every patient to the hospital. Which has its points.

At the other extreme is the new clinic of the Mayos, opened in March. In a dignified building of six stories something over 200 feet square, with the same beauty of interior and quiet taste that the brothers show in their own homes, Dr. Plummer has spent nearly a half million on a structure without its equal for completeness. The

clinics of a city like Vienna could do this work. But the difference lies in this—here is correlation, there rivalry. In this institution 125 people are employed, sixty-eight of whom are doctors under salary. They took care of 20,000 new patients in 1913. The organization has been called the longest step toward making medicine an exact science that has yet been taken. It is strange that it should come from private enterprise and not from the schools. For this is not only a great place for diagnosis and for surgical treatment, but for research. Six thousand dozen *x*-ray plates were ordered in a year; here is a great museum; with eight fellowships; with an entire floor given up to an animal house; its several animal operating rooms offering facilities to any well-accredited person; a forty-acre farm raising 1000 dogs a year—dogs that have never been anyone's pets. Data are gathered from an enormous material with an exactness that is Teutonic in its patience and American in its systematizing and labor saving. Here is coordination and a real study to eliminate waste effort, from which all dispensaries may learn. These men have traveled. Every twelfth month and fifth year each doctor must be at the business of seeing other men at work in his own line and studying to perfect himself. The rest days are allotted as scrupulously as the work hours. Withal the human element is not lacking. No men could be more approachable, more kindly than the brothers Mayo with all their true dignity. On the dispensary benches they are known affectionately as "Will" and "Charley." The benignity of Dr. Graham, the leading clinician, the compelling eye-twinkle of Dr. Wilson, the pathologist, and his contagious enthusiasm; the freedom from pomposity, professionalism, and secretiveness in this atmosphere is a thing to feel and to go far to see. The evening meetings where each brings his travel experience or his reading; the follow-up by which the *x*-ray man sees the stones of which he cast the shadow or the cystoscopist views the interior of the bladder he pictured; the planned scheme of promotion and change of work; the fair price for fair work; all these things are worthy of our study. And the human touch, big as it is, is not the least of its attainments.

There may be, there doubtless are, some shadows on this bright picture. A case cared for by an intelligent and well-trained man in any of our great cities with the assistance that he can command will yield an individual product more finished, more perfect, more personally studied than the best Ford factory in the world in the way of a clinic can produce. But this detailed costly individual study is impossible for the majority of people. Wholesale work done

with the utmost thoroughness and conscientiousness has got to be carried through for crowded, suffering humanity. Before we criticise it is up to us, with our great city opportunities, to combine and produce results as good or better even if it be only a clearing house for medical failures of our own section. Rochester has nothing on us in craftsmanship, in skill, in ability. But in far-sightedness, in simple directness, in that alert team play that sinks the individual in the good of the group; in keenness to go out and get and bring back the latest and best from every possible source I think it may well challenge any other institution in medical science to-day. As Dr. Will Mayo says, this thing can work itself out in but two ways, either the State must take over medicine, as it has made a start to do in England, or else through private agencies cooperation must come.

The ideal *office building* would be close to or connected with a hospital so that gas anesthesia for examination or minor operations would be feasible and a chance provided for rest to recover from painful or disturbing experiences. Or it should have a bed or two. Resident nurse and doctor are presupposed, as it is a center where medical aid is always to be had. Its laboratory equipment will be complete and ready for emergencies like the blood counts or autogenous vaccines that call for a resident pathologist. A Röntgen equipment is at hand. An operating room for minor surgery and dressings; sterilizing rooms; dark rooms for eye, throat, and bladder work and photography; hot-air apparatus, and electro- and hydrotherapy, massage and body building; all these are to be carefully thought out. The staff might be so developed that a representative of any of the leading specialties would be found at any hour in the morning or afternoon, and also in an evening shift. And the business manager would investigate credits, follow up delinquents and run the building under the self-governing medical staff.

One thing is fundamental. Too mechanical and cold-blooded a process in this human and humane work will not succeed. In any group work some one man has got to be responsible for and wholly interested in the particular individual and see that all necessary steps are followed through, the conclusions summarized, the results clearly stated to the patient. Theoretically this would be the medical man, the internist, the clinician. Practically it will be probably either the one who starts the patient round the circle or the one in whose department the chief trouble lies.

Another thing is clear. The division of a very moderate diagnosis fee into several parts involves no small amount of good will, and the allotment of a larger proportion to the medical man than he now

averages. Starvation returns are driving strong men away from medicine. The group must take care to develop this department to due proportion and import.

Plans of Office and Dispensary.—These have been studied in two previous papers, one concerning the individual office with multiple small* rooms and one describing the carefully planned gynecological section of the dispensary of Brooklyn Hospital.† These make for the essentials in work in our department—thoroughness, privacy, expedition. I know of no other dispensary wherein exists a dressing cabinet in a separate room for each examination, with a recovery room, and ample nursing service. With four tables there is no wait while a patient is loosening her clothing or putting it on, or for novocain to take effect, or for a patient to be made ready for treatment.

Dispensary Cooperation.—To coordinate and standardize dispensary work the out-patient clinics of New York (and also Brooklyn) organized under the title "The Associated Out-Patient Clinics of the City of New York" with an office at 17 West 43d Street, with Dr. S. S. Goldwater as secretary and Dr. Leroy Broun as one of the members of the Executive Committee. Their general aims are: coordination, the study of the sources of cases, of districting, and of the specialist dispensaries; the elimination of unworthy applicants, either by individual investigation or through a central bureau; the promotion of proper standards; the limitation of the number of patients to the facilities provided in a given institution, the overlooking of its equipment, study of social service to prevent overlapping and unnecessarily long trips; the hours of physicians; results of paid and unpaid worker; costs; nominal fees; and economy and efficiency in general. Recommendations for rules for venereal disease clinics were prepared and in many cases adopted; and various authoritative opinions obtained and circulated. The Section on Gynecology, which has upon it of our members, Drs. Boldt, Broun, Frank, and Studdiford, is headed by Dr. Oastler. It made a study of organization, equipment, and administration of gynecological out-patient departments and drafted recommendations as well as forms of history cards and cards of instructions to patients. For instance they advise: That the number of patients should be limited in accordance with the facilities in men and equipment of each clinic; that an average of six patients, old and new, per table per hour be

* Dickinson. System and expedition in office practice, office plans and details, *Med. Rec.*, May 6, 1905.

† Dickinson, The organization and working of a unified gynecological obstetrical department at Brooklyn Hospital, *L. I. Med. Jl.*, 1914.

adopted. That female syphilitics be referred to the Department of Syphilography or Dermatology, but that children with vaginitis be retained. A gonorrhoea card and a cancer card were issued.

Other efficiency engineers beside those mentioned have attacked our problem. Mr. Richard Waterman is the secretary of the Committee on Hospital Efficiency of the Philadelphia County Medical Society. Its report is to be had from the chairman, Dr. Edward Martin, 1506 Locust Street. It has taken up with the fifty-five hospitals of that city the questions of uniform accounting; of cooperative social service; of end-result studies. It calls for conferences by the appointment from each hospital of an "efficiency committee" made up of the superintendent, a member of the lay governing board, and a member of the professional staff. It has under way the study of the whole situation.

How to Start Scientific Management in Hospitals.—In a talk with Mr. Gilbreth in February, I asked him how he would go about the study of our problems. Although he was speaking of the hospital problem in general his answer would apply to a dispensary organization. "The ideal way," he said, "would be a demonstration hospital, but until one is started any institution could do these things: First, lay out a form for making a record; next, record the present practice in minutest detail; third, examine the data thus gained; fourth, organize a planning department; and lastly adapt the plan of carefully separated functions, with their functional foremen, to your special needs.

"With regard to the study of detail, make stereoscopic pictures of everything. No detail is too small to write down. Trace the route of a pill from the manufacturer until it goes down the patient's throat. Make the most painstaking statement of every single item of outfit and action. A doctor should be assigned to the engineer who would do this, taking, if necessary, two years and making Century Dictionary sized volumes.

"As to the examination of the data," he went on, "it is astonishing how just the laying bare of cold facts will be enough to reform and abolish no small proportion of the things that are wrong. Most institutions boggle at the proposal to make this kind of record. They are afraid of it. Most surgeons resent it, refuse it. But this is the way to better things, to chart every break in technic, stick it up, be public about it. And cure results.

"In the matter of the planning department," he said, "ask any institution for its chart. It looks foolish. It hasn't any chart."

He showed the chart of a factory organization and commented on

it. "There would have to be some alterations to fit this class of institution. For instance there would be no speed boss. In place of a gang boss, would be a teacher. There would be a repair man. There would be an inspector, who would be a very important part of the organization. His work would be not so much investigation as prevention. Investigation is the finding out of trouble after it happens, inspection is the keeping of everything up to the mark so that trouble does not happen. One might be said to be post mortem, the work of the pathologist. The other might be said to be preventive medicine. This man need not be a medical man. He is the checker up and is not the man who punishes or disciplines, for when he finds something going wrong, such as a nurse dropping gauze on the floor on her way to do a dressing or making unsafe contacts, it is he who reports to the disciplinarian. All breaks, all technical errors of whatever kind are entered by him. If a surgeon makes a fault in technic it is entered without malice and without any other idea than of checking up. Publicity about this list of errors, as in a ball game, is the great way of stopping trouble.

"The disciplinarian is the man who decides all the questions bearing upon faults made. A workman may commit several faults. Under the old régime it was three times and out. Then he was fired and a new man put in who was allowed to make *four* errors and then *he* was fired, and he too went off and got another job. Under the new way when the first man has made errors, one, two, three, he is every time gently but persistently corrected and that correction continues until he ceases to make that particular error.

"As far as possible all activities are charted in a peak and valley drawing. The peaks and valleys give us the clue to the high and low points of all our work and we proceed upon these clear indications.

"Be simple, use few tools. Imagine yourself operating out under a tree. Hunt out the best experience, measure it, make it standard, write it down on an instruction card. Above all get your people thinking in terms of elementary motions."

And here is an attempt—a maiden attempt—to embody his ideas in our dispensary work. The application to hospital work will be taken up in my next paper at the meeting of the American Medical Association in June.*

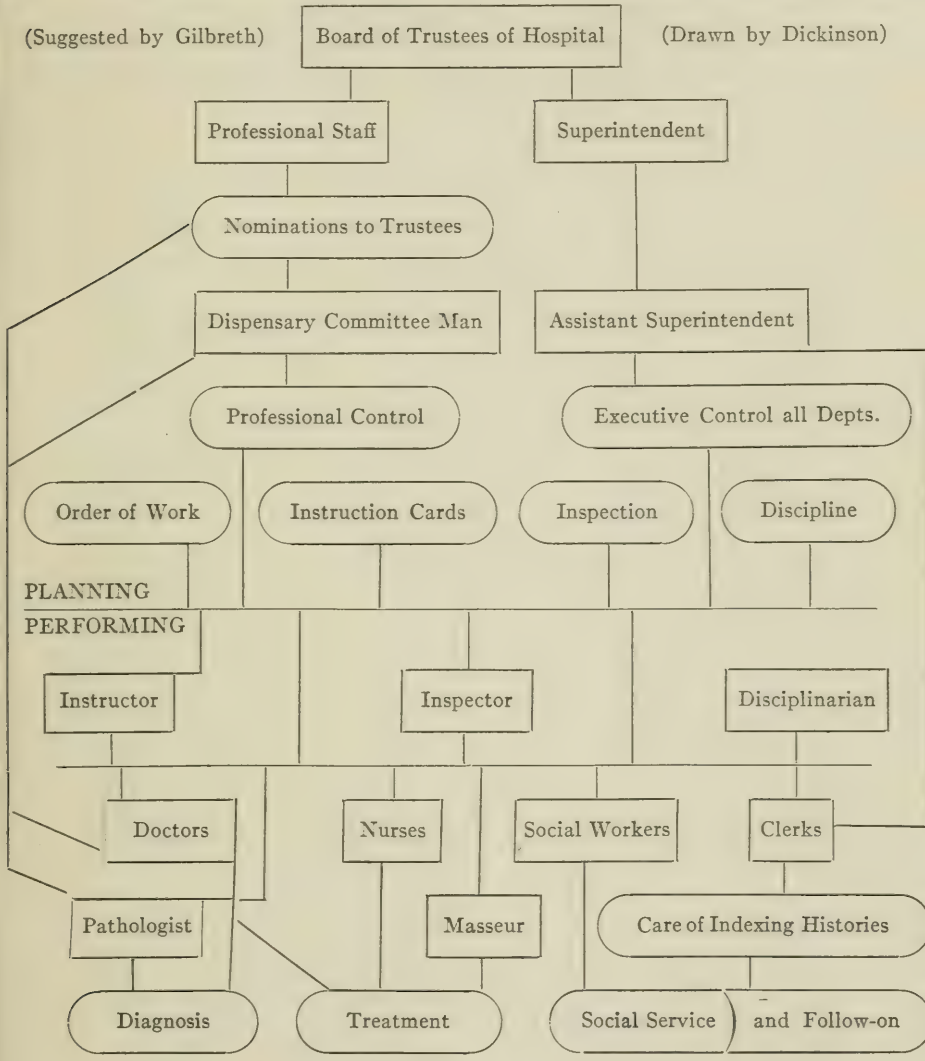
Standards.—We all admit that there is a best way of doing any particular thing. This best way is susceptible of determination by time-study, motion-study, and result-study. Once determined it may well be adopted as the standard at that time. Next month

*Standardization of Surgery, *Journal A.M. A.*, Aug. 20, 1914.

A CHART OF THE FUNCTIONS OF SCIENTIFIC MANAGEMENT IN A DISPENSARY.

(Suggested by Gilbreth)

(Drawn by Dickinson)



or next year a better way may be found. Until it is, the chosen standard remains. Meanwhile experiment to discover the best way is welcomed, and a reward allotted for successful ideas. Mr. Gilbreth declared that he finds surgeons impatient of talk of standards and incredulous of their being effective, and slow to submit to test of their opinions. To this I answered that I thought surgeons did not themselves appreciate how far they had already gone in this direction; namely, the overcoming of mere tradition and rule of thumb by elaborate series of tryouts and by written rule.

Among the matters affecting gynecological diagnosis that are susceptible of standardization I may schedule the following:

I. *History.* *a.* Form of blank to be filled out by patient. *b.* Form of blank to be filled out by doctor. *c.* Official nomenclature of diseases (Bellevue or International Classification of Causes of Death, or Nomenclature of Diseases of the Royal College of Physicians). *d.* Diagrams or rubber stamps bearing definite relation to average normal measurements. *e.* Blank form for statement of diagnosis (presumptive or positive) to be given to patient.

II. *Plans of Rooms.* In office, in dispensary, in hospital, in office building; lighting, darkening for artificial light; sound proofing; water closet; sterilizer; convenient placing of instruments yet out of sight of patient; dressing rooms; privacy; etc.

III. *Personnel.* Examiner, assistant, nurses, accountant, stenographer (dictaphone, dictagraph), telephone and door attendant; presence of third person at examination, etc. Consultant; clinician, neurologist, orthopedist, gastroenterologist, syphilographer, and others.

IV. *Outfit.* Table, tilting, for Trendelenburg and Sims; headlight; instruments; cautery; proctoscope; gloves for certain cases or all, etc.

V. *Procedure.* Amount of sterilizing of instruments; minimum requirement; preparation of patient (emptying bladder, extent of undressing, prevention of exposure); order of examination.

VI. *Speed.* Number of patients an hour, of old patients; of new patients.

VII. *Instruction Cards.* *a.* To assistants about procedure; *b.* to nurses; lists of instruments; orders about sterilizing, glove cleaning, preparation of patient, etc.; *c.* to patients.

VIII. Reports of work done; of results.

IX. Follow-on work and social service.

Is your office standardized? Mine is not. But while writing this I see some of the things I need to do.

Instruction Cards. A large field exists for specific and detailed

information to be given to patients. Among other cards in use in my office I give two as bearing on our title.

In the pregnant woman the diagnosis of miscarriage, tubal gestation, toxemia, placenta previa, and premature labor, soon enough for prompt action that may avert serious trouble, will be enormously facilitated by printed instructions. In this way only can cancer be detected sufficiently early to be helped.

Care during Pregnancy.

Lead a wholesome, simple life. Fresh air for two.

1. **MISCARRIAGE** most commonly occurs at the time when one of the first three periods would be due. For a week at each date guard against muscular strains, overtire, intense emotion, keeping mostly to couch and wrapper then, avoiding trolley, carriage, auto, husband, hard work, social functions, shopping, sewing machine, and any laxative (but enema allowed). Quinin, aspirin, salicin, strychnin, by direction only. If pains or flow begin take M. S. tablet, go to bed, notify doctor. Marked tendency to miscarry may necessitate continuance of these precautions most of the time until the fourth month. Backward displacement and forward bend of the womb cause many miscarriages; either may be present without pain at periods; therefore internal examination is desirable in every pregnancy just before or after the second omitted period. Do not fear "marking;" maternal impressions are a myth.
2. **CLOTHING** should be adapted to meet the individual need of warmth, and avoid pressure at the waist line. A maternity corset or belt may be needed after the fifth month.
3. **EXERCISE** is important, and hours out of doors; a brisk walk is followed by rest. Heavy strain is forbidden, but lifting arms above the head can do no harm. Permission needed for travel or motoring. Avoid overtire. Break the day by lying down twice. To bed early.
4. **DIET** is to be simple, wholesome. Food between meals may relieve nausea and faintness, and improve nutrition. Individual tendency to obesity and muscular sluggishness must be combated. In some cases one should replace, in the last six or eight weeks, half or two-thirds the usual amount of starchy foods (bread, cake, potatoes, rice, cereals, etc.), by green vegetables, salads, fruit. The teeth call for especial watchfulness.
5. **CONSTIPATION** is met by diet, exercise, and a fixed hour for going to closet. Black coffee on awaking; cold water twenty minutes later; meat once daily; raw fruit twice daily; stewed fruit, such as prunes, apricots, rhubarb, once daily; green vegetables and salads freely; olives, celery and sweet pickles (unless these disagree)—some or all of the above. With relaxed abdominal walls, corset or belt may help; or posture, such as squatting, forward bending, or upright sitting, during the movement. Failure by bedtime calls for an enema of 1 1/2 pints of lukewarm soapsuds. Continued constipation should be reported. For heartburn, 1/2 level teaspoonful of baking soda in 1/2 tumbler of water repeated in 1/2 an hour. To prevent cracking of skin of lower abdomen rub in lanolin every night in last two months.

6. **URINE** is to be sent on the first (and fifteenth) of each month after the . . . month. First passed in morning, 4 to 6 ounces, labelled with name. Before passing sample, wash the parts. If specimen cannot be sent, boil sample in tablespoon and report if it clouds.
7. **BREASTS:** The nipple should be developed to insensitive india-rubber—not tanned leather. Begin at the 5th month with 5 to 10 minutes daily massage, pulling outward with pulps of three fingers or by cupping glass ($\frac{3}{4}$ to 1 inch opening, with rubber bulb), intermitting if tenderness develops. To remove tiny dry scales, once or twice weekly smear on lanolin at night and lather in the morning.
8. **REPORT** at once any flow of blood, abdominal pain, urine below 1 quart a day, repeated headache, dizziness, dullness of sight, swelling of legs or face. Visit or report is made once a month, with examination six to four weeks preceding full time. Consult early with the doctor concerning engagement of nurse, and refer summer location. No vaginal douche unless ordered, and then warm only. Intercourse inadvisable after 6th month. Refuse to listen to depressing experiences. Question doctor and nurse freely. When in doubt telephone. (*Doctor's name telephone number and home follow.*)

Cancer of the Womb—What Every Woman Should Know to Protect Herself.

1. Cancer is at first a local disease, commencing as a small spot.
2. Hence the great importance of detecting cancer of the womb at its very beginning.
3. There are no infallible signs of the onset of the disease, but there are symptoms which are suggestive and which should lead the woman to consult reliable medical authority.
4. The most important of these is a bloody, or a blood-tinged discharge occurring at other times than the monthly period. This staining or spotting may be brought on by exertion, or such contacts as the approach of the husband, or the introduction of the syringe nozzle. At the change of life any thin, pale, watery or malodorous persistent discharge, even without blood-spotting, must be regarded with suspicion.
5. Any marked difference in the monthly period of a woman, at any time of life, demands examination, and particularly if it occurs at the time of the change of life.
6. The natural occurrence at the change of life is a lessening of the flow, with longer intervals between the periods, until they cease entirely. Hence any increase in the amount of the flow, or any increase in its frequency demands the most careful investigation. A harmful error is common among women, and is even shared by not a few physicians. It is thought that the change of life is naturally accompanied by excessive flow at the monthly periods, and that a flow even between the periods may be unimportant. Such an opinion is totally wrong.
7. This excessive bloody flow, or too frequent flow, or a discharge, does not always mean cancer. It may be due to other causes. A complete internal examination usually shows the cause. If it does not a scraping and a microscopical examination of these scrapings or of a bit of the so-called ulceration of the neck of the womb will settle the question. Any statement, even by a physician, that irregular flow has no significance should not be heeded unless based on *complete* examination.

8. Pain and loss of flesh and strength are not early symptoms. They may not even be present when the disease is well advanced.
9. The actual cause of cancer is still unknown. But it is known that local irritation constantly kept up may lead to the development of cancer. Hence a woman should not neglect the injuries or tears of childbirth, nor any local disorder of her generative organs, and as she reaches the age of forty should make sure that she is in good local condition.
10. The most common age for cancer to develop is between forty (40) and fifty (50) but cancer of the womb may occur at any age.
11. Thus far the only reliable treatment for cancer is operation, but in order that the operation may be attended with the best results *it must be done early*.
12. Once again. Cancer is at first a local disease. Everything depends upon recognizing its beginning.

Preliminary History.—Maximum thoroughness with minimum labor on the part of the doctor is effected by providing a new patient with a blank to fill out. Insurance companies have long furnished standard history outlines for the applicant to fill up. For years Madison Taylor has urged self-records and full data and from him my sheet is largely borrowed. That infective genius Plummer, of the Mayo clinic, has a plan of reducing histories to a mathematical basis, compactable, with countable factors, by the use of standard forms, letters or numbers for each item, a sheet for each department's history and a second for its summary. He told me in February that he had not a gynecological sheet. On his goiter sheet symptomatology is elaborately scheduled; elsewhere he merely prints a heading "subjective symptoms."

A preliminary history sheet like the sample I submit may be used in one of several ways.

1. The man beginning practice may fill it out himself or else regard it as a mere question sheet to train himself in orderly procedure.

2. With impatient people in line the filling of this sheet, on a board clip, may beguile the waiting of the new patient, if she has sufficient intelligence to have it given to her.

3. The man who sees patients by appointment has his secretary or nurse mail a copy to the prospective patient. Then, brought in by the patient, it may either be filed by those who use letter filing devices for their histories, the relevant items red-lined, or the important data summarized on whatever card or book one prefers. In any case it shortens and systematizes case recording even though it increases bulk. The mischance is avoided of overlooking such things as a fistula or gall-stones, or a family history of early deaths and bleeding habits. Patients are encouraged to keep health records. Furthermore, if we do as patients or their relatives have a right to ask of us—and eventually they will have the sense to require it—if we

give in writing the presumptive diagnosis, or the findings and procedure at operation, or the outline of treatment to add to this sheet. then we shall be making histories of some value—and not till then, Simpson has started something of this kind. And in the office on Utopia Avenue our lady of the future will walk in at her first introduction carrying her loose leaf book in her hand, the book that is an index to her insides. As it is at present only the man who has cut the leaves knows the contents and most people have very vague ideas of just what was done for them when they were under ether.

The only way I know to perfect a plan like this is to keep it in actual operation for a length of time and so developing its defects, improve and standardize. Each different specialty would put this emphasis in a different place and need a different form.

Though the public believes that we have some magic of intuition we ourselves know from sad experience that diagnosis is as patient an accumulation of a multitude of facts as Burns has shown detective work to be. A study of lives, a study of all organs, a record in order, a record in great detail—this is the line of progress.

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GYNECOLOGY—OBSTETRICS

PRELIMINARY CLINICAL HISTORY

To be made out by the patient or family; the whole blank being looked over before any answers are written.

It is suggested that the second copy be filled out and kept by the patient as a part of her health record.

A good outline that covers both health and ill health, set down in proper order and sequence, filled in when one has leisure to search the memory for half forgotten facts, may exert an important influence in solving problems of diagnosis and treatment. Matters that appear to have no bearing on the present trouble are sometimes of material significance. The space following a question is often insufficient for adequate answer. On a blank sheet, preferably of about this size, one would answer, starting with the number that corresponds with the question. Words needed for answers may be underscored (except under Family History), especially main symptoms. Help is to be asked of the doctor about questions that are not clearly understood.

Date.....

Name, Miss, Mrs..... Husband's name.....

Age..... Birthplace..... of Father..... of Mother.....

Occupation..... Address in town.....

Telephone..... Address out of town.....

1. Chief Distress or Disturbance. What *symptoms* bring you to the doctor....

.....
.....
.....

2. Family History. Occurrence among grandparents, father, mother, uncles, aunts, brothers, sisters, and children, of consumption, cancer, invalidism, obesity, hemophilia ("bleeders"), diabetes, gout, rheumatism, nervous prostration, mental defects or derangement, epilepsy, paralysis, alcoholism, and general tendency to vigor or lack of vigor. Note also whether family is long lived or not, and which parent one "takes after." Write below.

.....

3. Personal History. First give in outline here, then in detail further on under proper sections. State in actual sequence or order, with year or age as near as may be, any illnesses, weaknesses, accidents, falls, injuries, labors, miscarriages, operations. Name of doctor with each.

.....

4. General Health. As child, vigorous, fair, delicate, poor, bad, often ill. As young girl.

After periods began	.....	Since marriage	.....
Since childbirth	.....	Since operation	.....

.....

(End of first sheet of history)

What is your present state of health as to strength, activity, weakness.....

Average weight.....lb. lowest, and when..... highest and when.....

Any long weight loss.....Any surroundings that have affected your health.....

Under what conditions health at its best.....

5. Occupation and Habits. Childhood in town, country; long, short country vacations.....

School until.....college.....health at school.....
 at college.....

Gymnasium and sports at school or college.....

Outdoor life and habits, special expertness in athletics.....

Have you disliked vigorous exercise, or been unable to take it.....
 Given it up.....Favorite recreation, hobby or play.....
 Fresh air habits.....wide open window at night.....
 Oversensitiveness to cold.....thick or thin underclothes in winter.....
 Dependent upon corsets.....Backache without them.....Work done
 without them.....Ready made or to order.....

Bathing habits.....
 Nature of work formerly and now.....

Enforced sitting.....standing.....fatigue.....
 Number of hours at work.....work at home.....
 House work.....
 Average vacation, summer only, scattered through year.....
 summer housekeeping.....
 How many cups of coffee a day.....of tea.....any alcohol.....
 morphine ever.....
 Sleeping medicines.....bromide, much.....tonics.....

Any unpleasant peculiar effect from special food or medicines.....
6. Eyes. Any examination.....what diagnosis.....by whom.....
 Were glasses ordered.....was headache said to be due to eye strain.....
 and relieved.....
 Are you wearing them.....eyes ever protruding.....

7. Throat, Nose, Ears, Chest. Frequent sore throat.....tonsillitis or
 quinsy often.....
 Hay fever.....asthma.....bronchitis.....frequent colds.....loss of
 voice.....
 Frequent very prolonged cough and when.....ever spitting blood.....
 Pneumonia.....pleurisy.....tuberculosis.....under what doctors.....
 Ever persistent elevation of temperature.....Prominence or enlargement of
 neck, or of glands of neck.....

8. Heart and Blood Vessels. Have you had any disorder of the heart, what
 was it called.....
 When.....how long.....what doctor.....

Rheumatism, muscular, in joints, slight, severe, in bed, how long, when.....

Ever marked shortness of breath climbing stairs or hills.....
 Fainting spells.....palpitation.....
 Swelling of ankles.....hands and feet cold.....piles.....varicose
 veins of legs.....
 Any tests of blood made.....of blood pressure.....
 Anemia.....

(End of second sheet of history)

9. **Kidney and Bladder.** Ever said to be affected.
 Examinations of urine. what result. by whom. when.
 Puffiness of lower eyelids. swelling of legs. of whole body.
 Gravel, stone. blood in urine. painful urination.
 Frequent urination. how often at night. by day.
 When did this begin. when at its worst. what doctors.
 Kidney loose, movable, belt.
 10. **Skin.** In good order. oversensitive. good surface circulation.
 Perspiration, excessive. skin dry. pimples, where. worse at periods.
 Redness of nose or face at periods. eczema ever. moles.
 Hives. other rashes. itchings of surface, where.
 11. **Nervous System.** As child nervous. serene.
 St. Vitus dance (chorea).
 Any great nerve strain or breakdown, when, duration, treatment, sanitarium, worst features. Any shock
 At present easily tired, easily exhausted.
 Headaches, frequent. severe. what part of head.
 worse at period, only at period.
 Upper spinal aches. neuritis. numbness.
 Sleep, good, fair. poor. to bed, what hour. rise when.
 Frequency of loss of sleep. from baby. from society.
 Time of night wakeful.
 Convulsions. hysterical. when. how often.
 excitability.
 Loss of consciousness. of control of speech. of memory.
 mental dullness.
 Ever much depressed in mind. crying often. losing interest in family and daily happenings.
 Ever given to apprehension. of going out alone. of sleeping alone
 Irritability. worry for insufficient causes.
 Special anxieties, big worries, financial, maternal, marital.
 Flushes began. (dizziness).
 Bachache began. at its worst when. whenever tired.
 Worse at period, only at period. slight, severe, constant.
 In lower back on standing. on turning in bed. on stooping forward
 12. **Digestion, Stomach, Bowels.** Teeth good. good chewing teeth and opposite each other.

Any pus about roots.....ever an abscess, bone abscess.....do you
 chew thoroughly.....
 As child, digestion good, indifferent, poor.....in general how.....
 Any serious trouble and when.....
 Nausea.....vomiting.....pain after food or on empty stomach
distension (gas).....
 Stomach contents ever examined.....by whom.....X-ray.....
 Jaundice.....gall-stones.....appendicitis.....when.....
 Under whom.....treatment.....operation.....
 Any piles.....fistula.....fissure.....obstinate itching.....
 operation.....
 Treatment.....
 Rupture (hernia).....sagging of stomach, of bowels.....

(End of third sheet of history.)

Bowel Action formerly, recently. Give full history of constipation or looseness,
 and treatment, by diet, exercise, belt, medicine, enemas, whether bowel movement
 ever examined, by whom.....

.....

Piles, fistula, fissure, treatment or operation.....

.....obstinate itching.....

13. **Miscellaneous.** Spinal disease or curvature.....round-shouldered.....

flat feet, painful.....

Difficulty in walking.....

.....

14. **Menstruation, etc.** In childhood any leucorrhœa, local irritation, bed wet-
 ting, accident to parts.....

Periods began at.....year. In the earlier years regular; irregular; painful;
 profuse; scanty; long gaps; leucorrhœa.....

.....

Flow is now usually normal, scanty, profuse.....number of thick guards
 soaked in whole period.....

Color bright, brown, pale.....clots, gushes, membrane.....

Regular every.....days. Irregular, from.....days to.....

Last period, date.....on time, late; character as usual, scanty.....

Pain, dull, aching, cramp, drag, bearing down, slight, severe, constant, at
 intervals, lasting.....

Located in lower abdomen, in right, left groin, down thigh, in back.....

Began.....has increased, has been steady at periods since.....

Is present, is increased, before, during, after periods; worse from walking, work-
 ing, bowel movement.....

.....

of a unified gynecological-obstetrical department at Brooklyn Hospital.

Standardization of Surgery. An attack on the problem. *Jour. Am. Med. Assn.*, August 29, 1914.

THE FREIBURG METHOD OF DÄMMERSCHLAF OR TWILIGHT SLEEP.*

BY

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DÄMMERSCHLAF, or "Twilight Sleep" is the name given to that condition of the mind in which, while the patient remains perfectly conscious and intelligent, she at the same time loses a knowledge of present events when they are completed. In other words, a period of amnesia results, during which time painful sensations, which may be felt, are not stored up in the memory to haunt the patient after the ordeal is over. This condition is induced by the use of scopolamin in suitable doses and morphine, or one of its derivatives. Both of these drugs had been used in surgery and psychiatry for some time before Steinbuchel(1) in Gratz first used it in 1903 in alleviating the pain of childbirth.

Steinbuchel's goal was simply a diminution of the pain without narcosis; and his doses were less than those used in surgery. The patients in labor received one or two injections of 0.0003 gm. scopolamin and 0.01 gm. morphine. He reported twenty cases in which the alleviation of the pain was attained in every case but one, and in which the contractions of the uterus in twelve cases remained normal; in six cases the pause between the pains was prolonged and in two cases this interval was shortened. In three of his cases, in which chloroform was used in the second stage, in addition to scopolamin and morphine, there was some postpartum hemorrhage, although this did not occur in cases in which scopolamin and morphine alone were used. He reports that vomiting was not more often observed than normally, and that in one hysterical patient, there was a short period of excitement. His operative interference was very high, but the histories of the cases show that this interference was due to other causes than scopolamin and morphine. Steinbuchel's conclusions based on this report and other cases were that the method had no disadvantages; that the anguish of the labor pains was markedly diminished without the patient losing consciousness, there was no weakening of the uterine contractions and no intoxication of the child. We find others trying this method with varying success.

* Read at a meeting of the New York Obstetrical Society, October 13, 1914.

Wartapetian(2) reported twenty cases in which 50 per cent. of the children gave signs of intoxication, which was due to too much morphine. He reports the intensity and frequency of the contractions were very slightly influenced, but the anguish was markedly diminished. He believed the method not dangerous to the mother.

Reining(3) carried on further investigations in which he made one injection of 0.0003 gm. scopolamin and 0.007 gm. morphine; but this had no effect upon the patient. By repeated injections he was able to report in thirty-six cases a diminution of the pain in all except three where occasionally there was some confusion and excitement present, and the strength and duration of the contractions of the uterus were diminished, but not to such a degree as to jeopardize the life of the mother or child. In thus diminishing the amount of morphine injected he was able to very much improve Wartapetian's statistics as to the asphyxia of the child. In his series only one child was so born.

Weingarten(4) in Giessen reported good results in forty-five cases by the injection of 0.0003 gm. scopolamin and 0.01 gm. morphine. The diminution of the pain was marked in thirty-eight cases, in all of which there was no weakening of the uterine contractions, and in which four of the children were born with asphyxia due to independent obstetrical conditions. There was no postpartum hemorrhage.

Ziffer(5) reported thirty-one cases, using a single dose of 0.0003 gm. scopolamin and 0.01 gm. morphine in which the results were fairly successful in diminishing the amount of pain.

Pusching(6) reported sixty-two cases, using 0.0005 gm. scopolamin and 0.01 gm. morphine, and generally only one injection in which the diminution of the pain was good, or very good, in most cases, with no unpleasant by-effects. In most of his cases he noticed a slight lengthening of the interval between contractions with unweakened intensity of the single contraction. He reported slight postpartum hemorrhage in 16 per cent. of his cases.

Bertino(7) reported sad experiences with scopolamin and morphine. In 400 cases he gave 0.0005 gm. scopolamin and 0.01 gm. morphine, one or two injections, in which there was loss of pain without disturbance of birth achieved in 45 per cent., but with no success in 36 per cent. In thirty-eight of his cases, contractions of the uterus ceased, but returned again in from several hours to several days. In seventy cases there were unpleasant disturbances of vision, mydriasis, and mental confusion lasting several days. In his cases, there was 20 per cent. of apnea and asphyxia.

Gauss in Freiburg took up this method of Steinbuchel's and found

that by a slight increase of Steinbuchel's dose there was a disturbance of thought without loss of consciousness "a kind of 'twilight' condition in which the woman retains perception but can no longer apperceive"—in which condition the patient remembers everything happening prior to the injections, while impressions taking place during the effect of the drug are recognized but not remembered. During this period the woman gives ample evidence of painful contractions and will answer questions intelligently; and in many instances seems to have a knowledge of what is transpiring. She may even complain of the pain and may ask for chloroform. In the intervals between the pains, however, she sleeps and after the effect of the drugs has worn off, she has no memory of pain or of the birth of the child.

Gauss used 0.00045 gm.—0.0006 gm. scopolamin and 0.01 gm. morphine in separate solutions. The effect of the drugs showed in from three-fourths of an hour to three hours, and if this did not appear, scopolamin 0.00015 gm. without morphine was injected and so on until the twilight sleep appeared. As a proof of the scopolamin effect he used various tests:

1. *The Pupillary Test.*—It is well known that during the painful contraction of the uterus, the pupils will dilate. When the patient is under the influence of scopolamin, this pupillary reflex to pain is not present. This test is not always successful.

2. *Motor Coordination.*—The effect of the scopolamin is to produce in the patient a locomotor ataxia, and if the patient is asked to touch the tip of her nose with both hands she will find considerable difficulty in so doing if she is in twilight sleep.

3. *Memory Tests.*—An object is shown to the patient, or some manipulation is done and if in from twenty to forty minutes the patient has lost memory of this object, or manipulation, she is at that time in Dämmerschlaf, although the painful sensations are only slightly diminished and the expression of the patient shows that pain is felt. Gauss maintains that the attainment of absolute painlessness is a demonstration of overdosing. The action of the scopolamin and morphine shows itself by the lessening of the anguish of the labor pains and by the drowsiness of the patient who sleeps between the pains.

4. *Babinsky Reflex.*—The presence of the Babinsky reflex is a useful sign that the patient is under the influence of scopolamin and that the future doses should be used with extreme caution; this reflex is not always present but it should always be watched and tested.

The secondary manifestations are dryness of the throat and mouth, thirst, which at times is extreme, and flushing, sometimes very

marked, of the face. Occasionally there is an irregular movement of the hands and at times there is considerable motor restlessness, the patient moving about in bed and sometimes getting out of bed. The patient frequently talks to herself and will answer questions which have been self-given; and in about one and one-half per cent. of the cases there is some mental excitation, generally of a mild degree; though occasionally this may be so marked as to require restraint. But this last condition is seen only in a hysterical type, with an unstable nervous system who, as we know, sometimes show considerable mental excitement during labor without the use of drugs.

These secondary effects of the drugs in no way hinder the progress of the labor, nor do they put the life of the mother or child in danger and to counterbalance them we save the patient the exhaustion incident to painful labor; we prevent the psychic trauma seen in prolonged labors. Again, secondary uterine inertia, which is dependent upon the physical and psychological exhaustion is prevented; and lastly, the physician is saved the importunities of the patient to interfere when interference is not necessary, and the risks and dangers to the patient by meddlesome midwifery are put aside. The patient after a few hours does not remember having gone through labor, the lying-in room has lost its horror.

Even if the twilight sleep is only partially successful and complete amnesia is not attained, we have at least mitigated the anguish of the labor and prevented the exhaustion.

Gauss(8) first published his results in 1906, in 300 cases using the dosage which we have indicated above. The scopolamin solution was kept in a white bottle protected from light and moisture. When there was any clouding or flaking in the solution it was not used. In his 300 cases, Dämmerschlaf was obtained in 78 per cent.; considerable lessening of the pain in 16.3 per cent.; negative in 5.7 per cent., due either to too quick progress of labor, or too small dosage. With proper dosage he was unable to distinguish the scopolamin babies from others. By slight overdosing, oligopnea of the child appeared in which the child cried when born, but breathing was irregular for several minutes until the normal type set in. By strong overdosing, apnea of the child resulted. Of 303 babies (three times twins)

Born alive.....	98.3 per cent.
Stillborn	1.7 per cent.
Crying lustily.....	56.4 per cent.
Asphyxia.....	14.2 per cent.
Oligopnea and apnea	27.1 per cent.

The mortality of the children during the first week was no greater than otherwise. It must be remembered that in this first series of Gauss' the best method of dosing had to be worked out, and the best results were, therefore, not attained. As the number of births at Freiburg rose to 500, Gauss(9) reported these.

In this series there was a condition of irritability of the mother in 1.4 per cent., and the secondary manifestations of scopolamin were not particularly marked. In this series he observed the contractions of the uterus in 493 cases by placing the hand upon the abdomen; and in 451 cases the injections had no influence upon the force or frequency of the contractions. In eight cases the contractions were weaker (too much morphine). The bearing-down pains were spontaneous in 96.5 per cent., and by stimulation in 1.8 per cent. No bearing-down pains in 1.7 per cent.

From these observations Gauss recommended that scopolamin and morphine be not given in too large doses, but that small doses repeated as necessary were much preferable. Further, one must strive to get along with the least possible dose of morphine and care must be used to free the patient from any external excitement or stimulation; and he recommended that the ears be plugged with cotton, and that the eyes be covered. He found the length of the birth not prolonged, the average being sixteen hours and eleven minutes, and that the indication for uterine interference (12.6 per cent.) was not greater than otherwise. That the third stage of labor was not disturbed, that manual extraction of the placenta was necessary only in 0.6 per cent. and that the mothers nursed their babies after twilight sleep in the same proportion as otherwise.

Gauss(10) later reported his results in the first thousand births in *dämmerschlaf*. In the last 363 cases he measured the amount of blood lost postpartum and found that 92.8 per cent. of the cases had a simple physiological bleeding. That 6.3 per cent. had a moderate bleeding—from 500 to 1000 gm.; and in 0.9 per cent. there was considerable bleeding—from 1000 to 1500 gm. The placenta was expressed spontaneously, or through light abdominal pressure in 51 per cent. of the 1000 cases; and by Credé in 48.1 per cent.; 0.4 per cent. of the cases required manual extraction of the placenta. In the first 500 cases of this series, the forceps was used in 9.68 per cent.; while in the second 500 cases, this was reduced to 4.59 per cent. We see a corresponding betterment in the children also:

- First 500 cases, 23.5 per cent. born with oligopnea;
- Second 500 cases, 12.7 per cent. born with oligopnea;
- First 500 cases, 12.8 per cent. born with asphyxia;
- Second 500 cases, 6.3 per cent. born with asphyxia.

This improvement in the statistics was evidently due to a better technic, due to increasing experience.

Schlimpert(11) investigated the effect of the scopolamin-morphine upon the labor pains. In his early cases he used too great an amount of morphine and his results were not as satisfactory as in the later cases. He observed 122 cases and in 37.7 per cent. of these the contractions were not changed. In 31 per cent. the intervals between the pains were prolonged, although the strength of the pains continued the same. In twelve cases both the interval and the length of the pain were prolonged. In several of the cases there was a considerable diminution in the abdominal pressure. In spite of this, Schlimpert felt that this was not a very unfavorable effect, as the total length of the labor was only slightly prolonged and was due to too much morphine. Later on, with smaller doses of morphine, much better results were obtained at the Freiburg clinic. His dosage in the early cases was 0.00045 gm. scopolamin and 0.015 gm. morphine for the first injection; and 0.00015 gm. scopolamin and 0.005 gm. morphine for the following injections. This of course is too much morphine.

Lehmann(12) reported seventy cases of normal births in twilight sleep, using scopolamin 0.0003 gm. and morphine 0.01 gm., repeating this injection according to the severity of the pains. He achieved

Complete analgesia.....	61.6 per cent.
Lessening of the pains.....	37.0 per cent.
Negative result.....	1.4 per cent.
Contractions, uterus, unchanged in.....	58.7 per cent.
Contractions, uterus, improved in.....	25.0 per cent.
Contractions, uterus, made worse in.....	16.3 per cent.

The third stage of labor was undisturbed, except in one case of severe postpartum hemorrhage.

Children born with asphyxia.....	13.3 per cent.
Children born with oligopnea.....	10.0 per cent.
Rest crying lustily.	

Preller(13) reported 120 births in dämmerschlaf. He individualized his cases and gave his doses according to the reaction of the patient. The greatest amount of drug used all together was 0.0015 scopolamin and 0.02 morphine. In his series he had

Dämmerschlaf.....	70 per cent.
Lessening of the pain.....	18 per cent.

Negative result, 12 per cent., due to hasty delivery;
 Pains influenced unfavorably, 25 per cent. of the cases;
 Pains influenced favorably, 5 per cent. of the cases;
 Pains completely stopped, 2 cases;
 Abdominal pressure very much diminished, 25 per cent.

He ascribed this to too large a dose of morphine. The third stage of labor was not changed, except in four cases there was some post-partum hemorrhage; involution of the uterus and lactation were not influenced. In 5 per cent. of the cases there was a slight delirium and motor unrest in two cases.

Children born with oligopnea..... 25 per cent.
 Children born with apnea..... 5 per cent.

Among those who condemn the method in Germany is Hoch-eisen,(14), who came to the conclusion that the drug used is a terrible poison. He reported 100 cases in twilight sleep, in which the uterine contractions were good in 55 per cent.; totally absent in 6 per cent. and moderately depressed in 21 per cent.

Dämmerschlaf achieved..... 65 per cent.
 Complete amnesia..... 6 per cent.

In 18 per cent. there was no effect from the drug. He reports secondary effects of

Vomiting in 6 cases;
 Flushing of the face in 60 cases;
 Marked headache in 6 cases;
 Intense thirst in 45 cases;
 Profuse sweating in 2 cases;
 Marked unrest in 10 cases;
 Hallucinations and delirium in 4 cases;
 Severe clonic motions of the arms in 3 cases.

Hocheisen claimed that the bad effect on the uterine contractions and abdominal pressure caused a prolongation of the birth in 50 per cent. of the cases. Also the third stage of the labor was markedly influenced unfavorably. He observed

Atonic hemorrhages, 5 cases;
 Prolonged period of separation of the placenta, 13 cases;
 Involution of uterus very much prolonged, 15 cases.

Of the children:

Born with oligopnea..... 18 per cent.
 Born with asphyxia..... 15 per cent.

He also maintains that it diminishes the nursing power of the child; and interferes with the later development of the child.

In answer to Hocheisen, Gauss(15) claims that the solution he used was decomposed. Secondly, that the amount of the drug used and the method of giving it were wrong, inasmuch as Hocheisen did not use the memory tests, but instead gave his other doses until there was complete cessation of painful sensations. Gauss maintains that the cessation of all pain is an admission of overdosing, and that Hocheisen's results were due to his poor technic and that it is not to be wondered at that the results were poor.

Another antagonist of the method was Steffen(16) who reported 300 cases in which the first injection was 0.00045 gm. scopolamin and 0.01 gm. morphine. The following doses succeeded in from three to six hours. The highest total dose of scopolamin was 0.0015 and 0.02 gm. morphine. He did not use the memory test, but considered the effect on the uterine contractions and the fetal heart; and when the pains became weak, or the fetal heart slow, the drug was not repeated. Neither the eyes nor the ears were protected from light and sound. He reports good results in 41.7 per cent.

Unfavorable results.....	52.7 per cent.
No effect.....	5.6 per cent.

The contractions of the uterus remained

Strong.....	56.1 per cent.
Weaker and slower.....	38.3 per cent.
Absent.....	5.0 per cent.

The abdominal pressure was

Good in.....	70.6 per cent.
Slightly reduced in.....	11.6 per cent.
Markedly reduced in.....	10.3 per cent.
Totally reduced in.....	6.3 per cent.

Unrest and delirium appeared in 13 per cent.

Postpartum hemorrhage.....	3.3 per cent.
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The effect on painful sensations

Unchanged.....	18.6 per cent.
Diminished.....	35.0 per cent.
Absolutely suppressed.....	45.8 per cent.
Increased.....	0.6 of 1 per cent.

Length of the labor was prolonged

Of the children:

Born with oligopnea.....	16.0 per cent.
Born with asphyxia.....	2.3 per cent.

Steffen, therefore, states that the method will not bring the desired results, that it is not free of danger and not to be recommended in private practice.

Gauss maintains that his unfavorable results were due to the lack of the control of the drug by the memory tests, and points to Steffen's percentage, 45.8, of painlessness as an example of marked overdosing.

Bass(17) reported 107 cases of twilight sleep. He used 0.0003 gm. scopolamin and 0.01 gm. morphine in the first series; and 0.0006 gm. scopolamin and 0.01 gm. morphine in the second series. The second injection was given when the effects of the first injection had completely worn off and he did not use the memory test.

Mild twilight sleep.....	38 cases
Deep twilight sleep.....	26 cases
Negative result.....	28 cases.

The abdominal pressure was spontaneous in 69 per cent. of the cases and the placental period was not affected. Bass reports that the pain of the birth is, for the most part, greatly diminished. The birth is slightly prolonged, but without danger to the child or mother; the contractions of the uterus and the placental period are not changed markedly, and the abdominal pressure is not influenced unfavorably. For the mother he sees no bad effects; for the child, the drugs must be used with caution.

Frigyese(18) reports 200 cases from the Budapest "Frauenclinic," in which he carried out Gauss' method of twilight sleep. The highest total dose was 0.00195 gm. scopolamin (Merck) and 0.01 gm. morphine. He achieved amnesia in but 65.5 per cent., because in a great number of cases, the birth was terminated too quickly. When he considered only those cases in which several injections had been made, the desired amnesia was obtained in 80.7 per cent.; and diminution of the pain, without amnesia, in 25 per cent. Of the children, 2 per cent. were born asphyxiated, one-half of which was due to independent obstetrical conditions and not to scopolamin; 15 per cent. were born with oligopnea. All the asphyxiated and children with oligopnea lived. Two per cent. of the children were stillborn from independent obstetrical conditions and not because of the injections. In some of his cases, the breathing of the mother and the frequency of

the pulse increased, but not to any alarming extent. In 11 per cent. of his cases, the contractions of the uterus were weaker and in 7 1/2 per cent., on this account, the injections were stopped. In 2 per cent. of his cases, the abdominal pressure was lacking. Frigyesse blames the morphine for this condition; and as this condition cannot be prevented, he considers it its greatest disadvantage.

The third stage of labor was not disturbed, and there was no considerable postpartum hemorrhage. As secondary effects of the scopolamin, he noted dizziness and headache in 2 per cent. of the cases; slight excitation in 7.5 per cent. On the whole, he considers the method admirable and in proper dosage considers it not dangerous either for the mother or the child, though he warns against its use in private practice without sufficient experience.

Keinertz(24) used twilight sleep in 280 cases in which he closely followed the Gauss method. The greatest total dose was 0.00585 gm. scopolamin and 0.01 gm. morphine. Amnesia was obtained in 76.07 per cent.; partial amnesia in 12.18 per cent.; negative result in 7.17 per cent. In fourteen of the cases, because of too rapid delivery, no influence was noted. The average length of labor in primipara was nineteen hours and forty-eight minutes; in multipara, thirteen hours and nineteen minutes. Forceps were used in 10 per cent. of the cases, but mostly in elderly primipara, and in those cases who previously in the hospital had had abnormal delivery. However, Kleinertz observes that the contractions of the uterus may be diminished, particularly if the intervals between the injections are too short, or if the drugs are used before the labor pains are regular, which is apt to happen if one is not accustomed to the method. Thirst and dryness of the mouth were the only secondary effects noted, except in one cardiac case the injections were stopped because of the very rapid pulse. Some of the children were born with oligopnea, a few with asphyxia. Most were born crying lustily; none of the babies died. He maintains that the method is only for the hospital, and there only when carried out strictly according to the rules. He believes that the drugs have no essential influence upon the birth processes, and that it is without danger to the mother. That it has no bad influence upon the child, if one always keeps in mind the fact that perception of pain should always be present, or only slightly suppressed.

Beruti(19) reports 600 cases at the Freiburg clinic in which different preparations of the drugs were used, including veronal. On this account, the statistics, although they were very good, are not of much importance in the present discussion.

Avarffy(20) reports eighty cases from the Budapest clinic, in which the greatest dose used was 0.0006 scopolamin and 0.01 morphine, divided into two doses. Frequently the doses were less than this, with the result that amnesia was obtained only in 13.7 per cent. and the pains lessened in 41.2 per cent.; while hallucinations and delirium appeared in 2 1/2 per cent. He observes that the contractions of the uterus were markedly diminished in 37 1/2 per cent.; and that the contractions of the abdominal muscles were weakened in 20.2 per cent. and absent in 7 1/2 per cent. His operative frequency was 17.4 per cent., while postpartum bleeding occurred in 6 per cent. Of the children, asphyxia occurred in 8.6 per cent., oligopnea in 3.7 per cent. Avarffy admits he did not try to obtain amnesia; that the memory tests were not used, and of course he did not use the Gauss method.

Gminder(21) reports his experience in 100 cases, in which he used doses of scopolamin of from 0.0001 gm. to 0.00045 gm. with different doses of morphine—sometimes without morphine. The doses were repeated at short intervals until absolute painlessness was reached. By this method, of course, overdosing was unavoidable. He reports complete amnesia in 58 cases; incomplete in 24 cases; negative result in 18 cases. These negative results were due to improper solution, or to too rapid delivery of the child, or because the injections were stopped on account of the poor contractions of the uterus. As secondary effects, he notes cyanosis and irregular pulse of the mother in 4 per cent. of the cases; prolonged labor in 8 per cent.; postpartum hemorrhage in 5 per cent. Of the children, there were 15 per cent. born with asphyxia; 12 per cent. with oligopnea; 8 per cent. were stillbirths, and 4 per cent. of the babies died soon after birth. In his account of his experiences, Gminder does not recommend the method, especially in private practice.

In short, there was no attempt to follow the Gauss method and it is surprising that the results were not worse than reported.

THE TECHNIC OF TWILIGHT SLEEP.

Twilight sleep may be divided into three zones: *First*, that in which impressions are perceived and stored in the memory, and in which the patient, in consequence, is completely awake—although there may be a diminution in the amount of pain felt. This condition is due to too small a dose of scopolamin.

Second, that zone in which impressions are neither perceived nor stored in the memory; and the patient, therefore, is in a state of com-

plete narcosis. This condition is due to too free dosing with scopolamin or morphine.

Between the first and second zone there is still another zone in which perception is present, but in which there is no memory of events occurring at this time. This is called by Gauss artificial twilight sleep, and is the goal which the obstetrician should reach, but not overstep. When this zone is not reached the patient is in a condition of diminished analgesia, but with complete consciousness; the pains of birth are more or less diminished, but the patient is well aware of the pains of labor and she will remember them. When over-reached we achieve complete narcosis; the physiological reflexes are lost, the patient does not answer questions, nor is any perception present. This gives rise to many unfortunate effects, both for the mother and for the child. When the true zone is properly reached, we have a clouded consciousness, perception is still present, but memory of present events is lost and the natural processes of birth are not interfered with, nor is there danger to the child.

The technic of twilight sleep is rendered difficult by the varying susceptibility of different people to scopolamin and because of the necessity of continually testing the varying consciousness of the patient. While we recognize the difficulties, it is worth our efforts when we realize that a proper technic and a preparation of the drug, which is stable and constant in its action, make it possible to achieve twilight sleep without injury to the mother or to the child.

The basis of successful twilight sleep is the proper use of the memory tests. These tests must be uninterrupted throughout labor, and form the best and only means of gauging the consciousness of the patient. Some object, which is in common use in the obstetric room, is shown to the patient and after an interval varying from twenty to forty minutes, the same object is again shown to the patient, who is asked if she has seen it before. If the answer is affirmative, the patient at the time of the first demonstration, was in complete consciousness. If the answer is negative, the patient at that time was in twilight sleep. These tests are carried on continuously throughout labor, but we must make use of new objects as tests, because a continually recurring impression is apt to form a cumulative effect upon the patient's clouded consciousness to such a degree as to interfere with the test. It is for this reason that the knowledge of labor pains is of no use as a memory test. Instead of showing the patient certain objects, we may make use of various obstetric procedures, such as: pelvimetry, examinations, catheterizations, injections, as tests of memory; or we may make use of certain occurrences during

labor, such as rupture of the membranes, as a test of memory. The objects we use for the impression upon the patient in the memory test must be characteristic, peculiar, and not too frequently repeated, else it may give rise to irritation of the patient that might mislead one as to her memory.

Dosage.—The first dose consists of morphine muriate (0.01 gm.) injected subcutaneously with a record syringe; the needle is left in place and a second syringe, containing 0.0003 gm.—0.00045 gm. scopolamin solution is inserted into the same needle and injected. Three-quarters of an hour after this first injection the patient is shown some object with which we make the test; and then thirty minutes later is again shown this same object. If at this time the patient remembers having seen the object before, which is usually the case, we then give the second injection, consisting of 0.00015 gm.—0.0003 gm. scopolamin, but no morphine. If at the first test the amnesia is present, which is unusual, the second dose is withheld until further tests show the return of memory. The third and succeeding injections follow according to the tests, using 0.00015 or more of scopolamin as necessary.

Very seldom 0.0003 gm. scopolamin is sufficient to induce twilight sleep; occasionally scopolamin 0.00045 gm. is sufficient to induce twilight sleep; generally it takes 0.00075 gm.—0.00090 gm., plus 0.01 gm. morphine, to induce this condition. This dose, it must be remembered, is not given at one time, but is gradually injected according to the memory tests. Occasionally, it takes considerable more scopolamin than the above amount to induce twilight sleep. The essential point in the induction of twilight sleep is a gradual, subtle, scopolamin technic, beginning with small doses and reaching the twilight zone gradually. Different individuals show different reaction to scopolamin and, therefore, the working time of a definite dose of the drug varies. In some cases 0.00015 gm. will hold the patient in twilight sleep for one to two hours, whereas, others may require double that dose for the same period of time. Gauss maintains that the accuracy with which the specific reaction of a person is known as soon as possible from the memory tests is the art of twilight sleep, which is to be learned through practice and experience at the bedside. The doses of the drug may be very much lessened and the same end achieved by protecting the patient from sudden noises of other patients, or of the new-born, and by protection from sudden bright lights. On this account, the patient's ears are generally stuffed with cotton, and the eyes are protected by a bandage or dark glasses.

Under the control of these memory tests, one may give continually

new doses of scopolamin for a long period without cumulative effect. If this twilight zone, because of insufficient drug being used, is not attained completely, there will be single periods of the labor, or certain events during the labor, which have made an impression upon the patient and of which the patient retains memory. If these so-called memory islands are numerous, the patient will bridge them and may maintain that she has felt everything transpiring during labor, whereas she may have slept most of the time during labor; and upon close questioning, we realize that the patient has very little knowledge of the length of the labor, or of the labor in general, except for these memory islands. This does not mean to say that the twilight sleep in this instance was unsuccessful, it means simply that it was incomplete.

If the twilight zone has been overstepped, then we enter upon the zone of danger to the child, and we meet those unpleasant secondary effects upon the mother and upon the course of labor that have caused many men to discard the method. Gauss maintains that the failures to obtain twilight sleep are due: *First*, to attempts to force the condition in a short time. This relative overdosing causes disturbances, such as weak contractions of the uterus, cessation of the reflex abdominal pressure, and deep apnea of the child, which are depressing. Twilight sleep should be slow and gradual, induced with small and non-dangerous doses of the drug, and if the time is too short in which to attain our object, it is better to seek only a lessening of the pain rather than to try to attain amnesia at the cost of danger to the child.

Second, beginning the injections too early in labor is a frequent source of failure; primary uterine inertia is the one great contra-indication to twilight sleep. The injections should not be begun until there are regular, forceful, even painful, contractions of the uterus. There may be exceptions to this general rule.

Third, to suppress all appearances of pain is another source not only of failure, but is the cause of most of the bad results that have been reported by various observers. Gauss maintains that to achieve absolute painlessness is an admission of overdosing. It is to be noted that in this twilight sleep technic, morphine has been used in small doses (0.01 gm.) and given only once. One cannot put too much emphasis on the necessity of guarding the use of morphine in these cases. There may be occasional cases where a second very small dose of morphine may be indicated, but these are so exceptional that one is justified in saying that morphine should practically never be injected more than once and then only in the small dose mentioned.

Instead of morphine, one may use narcotine (morphine meconate),

which goes under the trade name of narcophin, in one dose of 0.03 gm. ($\frac{1}{2}$ grain).

At the present time at Freiburg they are testing out a method of twilight sleep without the use of the memory tests in which the drugs are given in a routine way, the object being to simplify the technic so that it may be used generally. This method was published by Siegel,(22) and consists of the following routine:

First dose, narcophen, 0.03 gm. and scopolamin, 0.00045 gm.

Wait forty-five minutes and give

Second dose, scopolamin, 0.00045 gm.

Then wait forty-five minutes and give

Third dose, narcophen, 0.015 gm. and scopolamin, 0.00015 gm.

Then wait one and a half hours and give

Fourth dose, scopolamin, 0.00015 gm.

The succeeding doses are given every hour and a half, and consist of scopolamin, 0.00015 gm. and with every third dose: narcophin, 0.015 gm., so that narcophen would be given at the third, sixth, ninth dose, etc., in addition to the scopolamin. This is the method that most men who have visited Freiburg during this last summer have seen tested and which they assume is the Freiburg treatment, when, as a matter of fact, it is simply being tested upon the fourth class patients and is not used on the private cases. This routine method gives fair results as far as the mother is concerned; but there is a large percentage of children who are born with oligopnea and apnea; and while in a hospital with proper attention these babies all are made to breathe, in many cases it requires considerable stimulation, artificial respiration, hot and cold baths, intratrachia catheterization, to bring them around. So that one could not conscientiously recommend this routine method for general use. While many cases of oligopnea will spontaneously breathe and cry if left alone, the deeper varieties require recuscitation. This condition is probably due in this method to the repeated injections of the narcophin. We must also realize that any drug as powerful as scopolamin cannot be used in the routine method when we are dealing with subjects of varying susceptibility.

It is a great pity that this method of Siegel's does not give near so good results as the individualizing method of Gauss, because the former is very much simpler; but from my record of the cases that I saw at Freiburg with the Siegel method compared with those

seen at Freiburg and since carried out by me in my work in private and in the hospital, I feel very positive that individualization gives very much superior results. However, the scheme of Siegel may serve as a framework for those who are not skilled in the Gauss method upon which to base their variations of dosage.

Toward the end of the second stage of labor, as the most painful period of labor approaches, it is sometimes necessary, and frequently advisable, to use small doses of chloroform, or ethyl chloride, to complete the twilight sleep. Of course, this anesthesia must be given with care as the patient in twilight sleep requires very little. However, there are many patients under the twilight sleep who require no such aid.

Drugs Employed.—The drugs employed at Freiburg are morphine-muriate in one dose of 0.01 gm. for the first injection, which is never repeated, except under most unusual conditions. This is used in solution and is prepared by the hospital pharmacist and kept in a ground glass, stoppered bottle. In the Siegel method they use narcophin (Narcotin-Morphine Meconate) manufactured by Boehringer & Soehne, Mannheim, Germany, of which the first injection consists of 0.03 gm. (1/2 grain), and the later doses, half this amount. This drug is supposed to have less depressing effect upon the respiratory center of the mother and child.

Another drug that is occasionally used is Pantopon in doses from one-sixth to one-third of a grain, to be repeated with extreme caution. Among those who have worked continuously in this twilight sleep, morphine-muriate in one single dose is preferred. I have used all of these drugs in twilight sleep and have obtained the best results with the morphine solution.

Scopolamin hydrobromide, the other component drug of the method is obtained from the scopol plant, and while chemists maintain that hyoscine hydrobromide is identical with scopolamin, hyoscine is obtained from the hyoscyamus plant.

At Freiburg they use only the scopolamin. It is difficult to get a stable preparation of this drug. Most watery solutions quickly decompose after sterilization, so that in a few days it not only does not give the effect expected, but produces secondary effects that are frequently undesirable and even dangerous. This decomposition forms, according to Gauss, a by-product, apotropin, which is toxic and has produced most of the bad results quoted by Hocheisen and others. A test for this decomposition of scopolamin was reported by C. G. Kessel and consists of adding a drop of a thin permanganate of potash solution to the solution of scopolamin when, if there is any

apoptropin present, it shows itself by the production of a brownish-yellow color; this test is very delicate.

To prevent the decomposition of the scopolamin, Prof. Straub of Freiburg added 10 per cent. of the sexatomic alcohol mannit to the solution. This preserved the solution, when properly cared for, for a long period of time, several years.

Preparation of the Scopolamin Solution.—A 10 per cent. solution of mannit in distilled water is made and filtered, to which is added scopolamin hydrobromide (Merck) in sufficient quantity so that 1 c.c. of the solution will equal 0.0003 gm. scopolamin. This is then sterilized in a flask in a steam pressure sterilizer, after which glass ampules, made of Jena glass of 1 c.c. capacity, are filled by means of a sterile hypodermic syringe. The ampules are then sealed and again subjected to steam pressure sterilization for three-quarters of an hour. The drug prepared in this manner will not decompose and is stable. For hospital use it may be sufficient to keep this scopolamin solution prepared with mannit in 15 c.c. glass-stoppered bottles, sterilized by steam pressure.

To properly carry out twilight sleep requires the use of a special chart, on which the time, the number of injections, the symptoms of the patient, memory tests, the fetal heart, the mother's pulse, etc., are noted, as is shown in the chart annexed.

At Freiburg and elsewhere there have been over 8000 cases of twilight sleep with very excellent results, both for the mother and for the child. A few, however, reported bad results. These were, in great part, due to faulty preparations of the drug and to the desire of the obstetrician to change the Gauss method according to his own insight.

There are certain disadvantages in conducting twilight sleep. It requires the constant presence of a nurse, skilled in this treatment, or better, the constant attention of the physician, who must give all his time to that particular patient. On this account, it becomes essentially a hospital proposition. It is not easy; it requires experience in the method and above all, requires a greater obstetrical knowledge than is in common use, because the patient's outcries do not force interference by the physician where it may be indicated. Again, as the scopolamin is so prone to decompose, unless specially prepared, it is possible that physicians may use a drug improperly prepared and may get therefrom bad results. And the uninitiated physician, who is accustomed to give much larger doses of morphine, may find it difficult to use so little as is necessary in twilight sleep. Again, if twilight sleep is to be properly carried out, it

requires attention to many details, such as stopping the ears, covering the eyes, darkening the room, preserving of quiet, protecting from bright lights, etc., that may be difficult of accomplishment in many places, especially where a large number of patients are being treated at one time. However, to those who have seen the advantages of a properly conducted twilight sleep, it will be worth while to take all these cares and precautions, to have the environment proper, to have stable preparations of the drug, and to give it that personal attention and individualization which is absolutely essential if the best results are to be obtained.

The production of a proper twilight sleep requires not only a technical knowledge of the method of using scopolamin and morphine, but also good obstetrical judgment based on an adequate understanding of obstetrical forces and conditions. It is for this reason that the method is best used by the obstetrician himself. It is easier to train a good obstetrician in the method of twilight sleep than it is to make a good obstetrician out of one who may know the method of induction of twilight sleep.

The relationship between obstetric knowledge and twilight sleep is so close and intimate that we cannot turn over a case to an anesthetist for this purpose, as one would in a surgical operation. In some cases it may be necessary for the physician to interfere with the process of labor without loss of time, and the best results are to be obtained only by a prompt recognition of the obstetrical necessities combined with a good training in the use of scopolamin.

The After-treatment of the Patient.—At Freiburg, within twenty-four hours after delivery, the patient receives passive exercises of the upper and lower extremities, abdomen, back, and perineal muscles. These exercises consist of flexion and extension, adduction and abduction of both extremities, and the patient is assisted to a sitting position in bed; these exercises are kept up for ten minutes, night and morning. On the second day, the movements become active ones and are continued throughout the patient's stay in the hospital. Within the second twenty-four hours, the patient sits up in bed a great part of the time; and during the third twenty-four hours the patient sits in a chair out of bed; on the fourth day she may walk about.

The only contraindications to this treatment are a severe, or moderate, laceration of the perineum, temperature in the puerperium, or anemia from loss of blood. The patient generally leaves the hospital on the sixth or seventh day. They have carried out this early rising method at Freiburg for a considerable period with no bad

results, in fact, their experience proves that the involution of the uterus in these cases is better than otherwise. The muscles are not allowed to atrophy, and the patients feel stronger on the third and fourth day than they ordinarily would on the tenth or twelfth. The early rising also seems to increase the milk supply, though it is difficult to see why this should be so. The patients take very kindly to these exercises, and after the first attempt, they look forward with pleasure to the repetition; and instead of feeling tired when they get out of bed, as one would expect, they seem very happy and active.

It is difficult for those of us who have been trained in the older method of two weeks in bed during the puerperium to accept this innovation without hesitation. However, the results at Freiburg were so good that I have been prompted to use the method since my return, and I have been surprised with what regularity and speed the involution of the uterus takes place; the fundus of the uterus being frequently just above the symphysis pubis on the fourth day. There is no interference with the lochial discharge, nor is it too profuse. There has been no tendency to a retroversion in any case. We have tried to follow these cases after leaving the hospital; but not always successfully, though we have never found any bad results in our reexaminations, but instead a well-contracted uterus. All the patients seem stronger with this method and we miss the languor which is so common in postpartum cases. This early rising, of course, has no intimate association with twilight sleep, except that there is little or no exhaustion, either mental or physical, after twilight sleep and the patients frequently feel like getting out of bed within the first twenty-four hours. We have used this early rising in cases not treated by twilight sleep that have had an easy labor, with equally good results.

Gauss maintains that by early rising we get less phlebitis, less retroversion, less muscular relaxation generally, and more rapid involution of the uterus. All of which are to the advantage of the patient.

The Danger to the Child.—While there is a concensus of opinion that the use of scopolamin in proper doses is devoid of danger to the mother, there is not an unanimity of opinion that the drugs used in twilight sleep have no bad influence upon the child. The danger to the child may be considered from four points:

First: The direct effect of the drug upon the child itself.

Second: The effect of the drug upon the forces of labor, prolonging the length of labor to such an extent that the child's life is endangered.

Third: The effect of the drug upon the child's early development.

Fourth: The effect of the drug on the nursing ability of the mother and its indirect effect, therefore, upon the child.

That the injection of scopolamin subcutaneously into the mother is absorbed into the circulation of the child is to be expected and can easily be proved by the presence of the drug in the urine of the child at birth. Holzbach(23) has made experiments upon the enucleated eye of the frog and has proved the presence of scopolamin in the mother's milk and in the urine of the new-born. In the child the drug is quickly excreted, generally within fifteen minutes if small doses have been used. If larger doses are employed, this secretion is very much slower and more prolonged, and generally gives rise to a peculiar condition of the respiratory center of the child in which there seems to be a respiratory paralysis lasting for a longer or shorter period, and showing itself as apnea or in lesser grades, oligopnea; if the dose of the drug has been excessive, a condition of deep asphyxia results in which the child's life is very much in danger.

In the condition called oligopnea the child frequently will make one cry as soon as born, will then become fairly blue and there seems to be no impulse to spontaneous respiration. After considerable accumulation of carbon dioxide in the child's circulatory system, there is a breath or two taken, and then the child returns to its blue condition. During all this while the fetal heart is very irregular, frequently getting as low as sixty beats to the minute and becoming faster after an inspiration. The intervals between these respiratory efforts become shorter and after a period of ten or fifteen minutes, the child begins to cry and may be said to be out of danger.

A deeper stage of this condition is called apnea and is due to too large dosage of scopolamin, or to the repetition of the morphine; and in this condition the child becomes first blue, then pallid, in which condition the fetal heart becomes exceedingly slow, and unless vigorous stimulation is used the child's life is very much in danger.

That deep asphyxia may ensue after an unwarranted dosage of scopolamin, or too large a dose of morphine, has been demonstrated beyond any doubt and would seem to argue for care and prudence in the administration of the drug. When scopolamin and morphine have been used carefully, and where the doses have been gauged according to the patient's susceptibility to the drug, the child should be born crying lustily. Of course, this desired result cannot be expected in a large series of cases where different members of a staff are using a routine treatment, or if they are not sufficiently skilled

in the use of the drug to individualize their cases. With proper experience and knowledge, and with study of the individual case, it is possible to have practically all the children born without any signs of the scopolamin poisoning.

The fact that conditions of mild apnea, or oligopnea will frequently take care of themselves, and that the higher grades of apnea may be met by appropriate stimulation is no argument for the unskillful or routine use of the drug; for when the mother is overdosed with scopolamin there is a distinct danger to the child. That increased experience and knowledge will diminish to a great extent oligopnea and asphyxia is proved by the statistics of the Frauenclinic at Freiburg where in their first 500 cases there were 23.5 per cent. of oligopnea, and 12.8 per cent. of asphyxia cases; in the second 500 cases these percentages were diminished by one-half. And at the present time, when the cases are treated individually and by competent men, the percentage of oligopnea and asphyxia has fallen to almost nothing. However, when the routine treatment is used, and by assistants not especially skilled, the percentage of oligopnea is still fairly high. Proper dosage and individualization is the key to the successful use of twilight sleep.

Beside this direct effect of the drug upon the child we must consider, secondly, the effect of the drug on the birth processes and length of the labor as having an indirect effect upon the child. That the period of the labor is lengthened is admitted by all who have had experience with the method. That this prolongation which averages one hour in primipara and one-half hour in multipara is of little account when the drug is properly used is admitted by most authorities.

However, Hocheisen(14) considers the prolongation of labor as a distinct danger to the child. He maintains the drug has a deleterious effect upon the strength of the uterine contractions and especially the voluntary contractions of the abdomen; that the length of the labor is tremendously increased and in that way has a bad influence both on the mother and on the child. Steffen(16) has reported cases where the abdominal muscles refused to work completely. This result is entirely due to improper dosage, but it at least shows us the possibility of bad results with this method. Wartapetian(2) reports similar cases.

Other authors, such as Gminder,(21) and Bass(17) and others have reported cases in which the effect of the scopolamin seems to linger with the child, showing itself as an excessively sleeping condition in which the child refused to nurse and in which the reflexes are very slow and in which the pupils are dilated and without reaction. The

statistics of the Freiburg clinic in regard to the number of children stillborn seem to show that this is less with the twilight method of delivery than without; and this has been ascribed by Aschoff to the fact that the numbing of the respiratory center of the child with scopolamin prevents the premature reflex respiration of the child and lessens the danger of aspiration of liquor amnii. This, however, is no argument for overdosing.

Concerning the effect of the drugs upon the secretion of the mother's milk, statistics at Freiburg, as reported by Gauss and Guenzer, seem to prove that the drugs have no effect upon the breast function in spite of the fact that it may be proved that the milk contains, for the first two or three days, small doses of scopolamin, but not enough to affect the child. The milk secretion of the mother seems to be increased by the early rising out of bed which is practised in these twilight cases, and seems to be due in great part to the lack of exhaustion, which is seen in many labors not aided by scopolamin.

What effect the use of the drugs has upon the development of the child in later life is difficult to demonstrate. Some authors, such as Hocheisen and Bass lay a good deal of stress upon this, but their arguments are not very convincing. Salzberger (*Inaug. Diss.*, Freiburg, 1910) investigated this matter in the Freiburg clinic and found that the mortality of the twilight babies was no more than the normal mortality. And his investigations seem to prove that during the first year the drugs had no deleterious influence upon the development of the child. His conclusions were that scopolamin, when carried out with regard to the proper dosage, had no dangerous effect on the life, health and development of the child.

Because of the fact that many of our patients come into the hospital during the second stage of labor, we have not been able to give all of them the advantages of twilight sleep; for it must be remembered that it generally requires one and one-half to two hours and sometimes longer before a patient enters the twilight zone; so that we are able to report only forty-one cases. Of these there were among

Para	
i	24 cases
ii	9 cases
iii	2 cases
iv	4 cases
v	1 case
ix	1 case

The injections were generally started when the pains were regularly recurring every five minutes.

The smallest number of injections was one consisting of 1.5 c.c. scopolamin (0.00045 gm.) and 1 c.c. morphine (0.01 gm.). The largest number of injections was twelve consisting of 7.5 c.c. scopolamin (0.00225 gm.) and 1.5 c.c. morphine (0.015 gm.). On the average the scopolamin given consisted of 4.5 to 5 c.c.

When using morphine (which seems best to us) only one injection of 1 c.c. (0.01 gm.) was given, except in three cases, and in these three cases there were two instances of oligopnea of the child.

In using narcophin, the smallest dose was 1 c.c. (0.03 gm.) and the largest dose 2.5 c.c. (0.075 gm.) the latter dose giving only a partial success.

Pantopon was used in one dose of $1/3$ grain.

In some of our cases the second stage of labor was slightly prolonged, requiring the use of pituitary extract and the application of low forceps more often than in cases without twilight sleep; this prolongation is not usually a matter of much significance but it may require prompt interference and always demands careful watching and obstetric judgment.

In a few of our cases a small dose of chloroform was given by inhalation at the end of the second stage.

The third stage of labor was in every way very satisfactory, the placenta being expelled spontaneously or by very light pressure in all cases and generally in less time than usual. There was no post-partum hemorrhage of any kind except in one case of a para-ix, who had a moderate hemorrhage; in fact, the bleeding after the birth of the placenta is as a rule remarkable because of its small amount.

Of the forty-one babies thirty-five or 85 per cent. cried lustily as soon as born, without any stimulation; there were three cases (7 per cent.) with oligopnea (all lived). In addition there were three cases in which the umbilical cord was wound twice tightly around the child's neck, with one oligopnea and one apnea (both of which were resuscitated) and one stillbirth; this stillbirth would not have happened had proper measures of resuscitation been instituted.

As to the success of the treatment for the mother there was attained

Complete amnesia, 32 cases, 78 per cent.

Partial amnesia, 4 cases, 10 per cent.

Analgesia without amnesia, 1 case, 2 per cent.

Failures, 4 cases, 10 per cent.

Of the failures, two cases had only one injection, which, of course, is not a fair test.

During the latter part of the second stage four of our cases (10 per cent.) had moderate restlessness and two (5 per cent.) had severe restlessness requiring restraint. By skillfull technic this marked

restlessness may be avoided, with few exceptions. The postpartum course of all our patients was uneventful; one patient had a slight rise in temperature because of the retention of a small piece of the placental tissue.

Most of the cases were out of bed on the third day and were discharged on the sixth or seventh day and the final examination revealed in every case a well-contracted, normally anteverted uterus; as far as we have been able we have examined our cases two weeks after leaving the hospital, without finding a single retroversion or other untoward sign.

A small series like this one, of course, proves nothing but gives an intimation of what we may expect in the future; our results, I am quite sure, will improve rather than the reverse.¹

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¹ Since reading the above paper in October we have had forty additional cases of Twilight at Gouverneur Hospital; and by using one dose of morphine and by carefully individualizing the patients and by using very little drug in the second stage of labor, we have had no fetal or maternal mortality, no apnea or asphyxia, no oligopnea except when the cord was wound tightly around the child's neck, no post-partum hemorrhage of any account; and by the judicious use of small doses of chloroform near the end of the second stage we have been very successful in maintaining complete amnesia of the entire lobar without even approaching the danger zone in the use of the drugs. Our operative percentage (forceps) has also remained very small. So that we feel that the enthusiasm of Gauss is based upon experience with his skillful technic; if our good results continue, it will become difficult for us not to grow enthusiastic also.

CHARTS FOR RECORDING DETAILS OF LABOR.

No. Date	Name Address	Age Para	Twilight sleep in light, medium, dark room Success: complete, partial, failure. Complications			
TIME: (pains began: _____)						
INJECTIONS: drug, amount, make, other NOTES. (Memory)						
SUBJECTIVE SYMPTOMS: Fatigue Thirst Pain in back, abdomen, perinæum						
OBJECTIVE SIGNS: Sleep, during, between pains Movements of the hands Flushing of the face Influence upon pain sensation Consciousness Excitation						
COURSE OF LABOR: Examinations Rupture membranes. Interference, Bearing down pains.						
PAINS. Abdominal pressure a. how strong a. good b. how long b. medium c. how frequent c. poor						
FETAL HEART PULSE BREATHING TEMPERATURE						
TIME:						
INJECTIONS: drug, amount, make, other NOTES. (Memory)						
SUBJECTIVE SYMPTOMS: Fatigue Thirst Pain in back, abdomen, perineum						
OBJECTIVE SIGNS: Sleep, during, between pains Movements of the hands Flushing of the face Influence upon pain sensation Consciousness Excitation						
COURSE OF LABOR: Examinations Rupture membranes. Interference, Bearing down pains.						
PAINS. Abdominal pressure a. how strong a. good b. how long b. medium c. how frequent c. poor						
FETAL HEART PULSE BREATHING TEMPERATURE						

BIRTH OF CHILD (time):

Spontaneous (Operative by:.....)

Rupture membranes: Position

Preparation

CONDITION OF CHILD immediately after birth:

Respirations Spontaneous

Asphyxia-light, deep.

Obigopnea, deep apnea, 1

Stillbirth, macerated

Artificial respiration by:

CONDITION OF MOTHER during birth of head:

(Apparently) clear recognition

(") light cloudy recognition

(") in mild (deep) twilight sleep.

in very deep twilight sleep, reflexes lost

with Ethyl chloride, chloroform, ether, intraspinal.

with (without) slight expression of pain,

with moderate (very) marked expression of pain.

CARE OF CORD: Clamped with (without) tying

long-short, Dressing:

BIRTH OF PLACENTA:

Spontaneous, by abdominal muscles and uterus

by light pressure

by credé (with) without anesthetic

by manual separation

Without Bleeding, with slight, moderate, (very) severe bleeding, before, with, after birth of placenta.

Amount of blood lost:

TEMPERATURE, pp:

PULSE pp:

REMARKS:

CRITIQUE OF TWILIGHT SLEEP.

I. SUCCESS:

II. PAINS: 1st stage:

III. PAINS: 2d stage: (especially abdominal)

IV. POSTPARTUM HEMORRHAGE:

V. CONDITION OF NEW-BORN

VI. COMBINATION OF DRUGS USED

VII. SPECIAL REMARKS.

ON THE SPECIFICITY OF PLACENTAL PROTEINS IN SKIN REACTIONS OF THE HUMAN BODY.*

BY

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A GREAT deal of work has been done in recent years on diagnostic skin reactions in various infections. Probably the best known and most important are the tuberculin reaction of Von Pirquet and the luetin reaction of Noguchi.

One of us(1) has been engaged in working with the Abderhalden Test. It occurred to us that if a ferment were circulating in the blood of pregnant women which was specific for placental proteins, the principle upon which the Abderhalden Test depends, then by introducing some of this protein under the skin a reaction might be obtained which would differ in nature or intensity from the reaction obtained in nonpregnant women. To detect differences in the reaction of pregnant and nonpregnant cases, the following points were observed:

1. Local reaction, manifested by its size, redness, painfulness, and tenderness at site of injection, and by involvement of the regional lymphatics.
2. General reaction, as shown by changes in the temperature and pulse, and also by headache, malaise, backache, chilliness, itching, nausea, vomiting, and uterine contractions in the cases of pregnancy.
3. Other special symptoms of anaphylactic reaction, as respiratory disturbances, changes in the blood pressure, eosinophilia and changes in the urine.

By this means it was hoped that the difficulties met with in carrying out the somewhat complicated Abderhalden Test would be obviated.

We injected pure proteins or proteid fractions of the placenta as well as with whole placenta in order that our work would be somewhat comparable with that of Vaughn, (2) who studied anaphylactic reactions using various pure proteins as sensitizers; and with

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that of Wells(3) who used edestine, probably the purest protein preparation known at present.

The work along this line dates back to the experiments in 1910 of Sammerbruch and Heyde(4) who showed that when a pregnant and a nonpregnant rat were united by anastomosing blood-vessels, labor in the former caused sickening, convulsions, and sometimes death in the latter. They tried to explain this phenomenon on the basis that a toxin in the blood of the pregnant rat, to which she was immune because of the pregnant state, became greatly increased at the time of labor, and affected the nonpregnant animal. Heyde (5) next tried the injection of fetal serum into women at or near term. He used from 2 to 48 c.c. Nine out of sixteen cases failed to show any symptoms even after two or three injections. The positive reactions, manifested by the onset of labor, might have been due to the specific effects of the serum, or to a psychic reaction; or they may have been merely coincidental. Fromme (6) found absolutely no reaction after the subcutaneous injection of fetal serum. However, when he used fresh and active ox serum he got a characteristic reaction consisting of an edematous, red, and tender swelling at the site of injection. Using 0.2 c.c. as a dose he obtained 27.6 per cent. positive results in pregnant cases from the 20th to the 32nd week, 78.6 per cent. positive from the 32nd week to the 36th week, and 75.6 per cent. positive from the 36th to the 40th week.

A. Hirschberg, (7) after a review of the literature, comes to the conclusion that pregnant women, that is, women sensitized in the anaphylactic sense through the changes accompanying pregnancy, must react to the injection of foreign proteins.

P. Esch,(8) after injecting a large number of women intra- and subcutaneously, feels that the sensitization of gravid women cannot be demonstrated by reactions from intracutaneous injections of horse serum or of placental extract. Furthermore, he shows that the urine of women during parturition does not become highly toxic as does the urine of animals during anaphylactic reaction. This, therefore, speaks against the theory that parturition is a form of anaphylactic reaction due to the sensitization of the mother by the proteins of the placenta or fetus. To show that anaphylactic shock can be obtained by the intracutaneous injection of horse serum, he injected two persons, who, a few years previously, had antitoxin administered in the usual way. In both he got typical anaphylactic symptoms. He injected himself eleven years after a therapeutic dose of antitoxin with 1 c.c. of horse serum altogether,

0.4 c.c. being intracutaneous and 0.6 c.c. being subcutaneous. A severe reaction followed with nausea, vomiting and urticaria, compelling him to stay in bed two days.

Our work was begun in December 1913 and completed before the publication of a recent article by Englehorn and Wintz.(9) These authors claim to have obtained a distinctly positive reaction in seventy-three known pregnant women, and a negative in fifty-three known nonpregnant women suffering from various pathological conditions including carcinoma, sarcoma, cysts, and inflamed adnexa. The reaction was negative in several males. They found a slight positive reaction in several nonpregnant females just before menstruation. Their reaction was obtained from the seventh week on, and disappeared in the puerperium. P. Esch,(10) using the expressed juice of the placenta, and also a globulin and albumin fraction thereof obtained by fractional precipitation with ammonium sulphate, found that intracutaneous injections gave very questionable results. Redness and swelling of the part resulted, but 25 per cent. of nonpregnant controls reacted as strongly as 30 per cent. of the pregnant cases. All other controls reacted but to a less extent. When fetal serum was used with sub- and intracutaneous injections, negative results were obtained.

F. Schenk(11) injected homologous and heterologous testicular tissue subcutaneously into pregnant and nonpregnant rabbits. He observed a more severe reaction in the pregnant rabbits. This reaction was heightened when horse serum was added to the testicular tissue. He found also that by adding horse serum he could produce the reaction with ovarian and with liver tissue. Dungern and Hirschfeld(12) made similar experiments one year previously, and arrived at the same conclusions.

Lake,(13) in an attempt to obtain a protein from the placenta which could be used in producing an immune serum of therapeutic value in chorio-epithelioma, found that nucleoprotein, globulin, albumin and gelatin fractions failed to produce a specific antiserum as measured by the precipitin, complement-fixation and by the anaphylactic reactions. The reactions obtained were attributed to the general species reaction.

In our work the greatest stress was laid on the local reactions, but general reactions were noted as well. It was found that in all cases no constant or appreciable variation was seen in the pulse, temperature and respirations in either pregnant or nonpregnant cases. Blood examinations included leukocyte and differential counts. No leukocytosis or eosinophilia was noted. Blood pressure

did not vary from the normal as noted before injection. Slight tenderness and swelling in the regional lymphatic glands were noted in a few cases. It was seen early in the work that the Pirquet method and the deep or subcutaneous injections gave such unreliable results that it was decided to work entirely with the intracutaneous injections. In doing this we were especially careful to inject equal amounts of protein at equal depths, in both the pregnant cases and the controls. On account of the varying thickness of skin in different cases, this was not always an easy task. The reactions were read at the end of eighteen, twenty-four, thirty-six, and forty-eight hours. In most instances, drawings were made at each observation showing the size of the reaction.

The cases selected were all of the same class, that is, patients in Cook County Hospital. The pregnant individuals were all young women, the majority of whom were primiparæ, and in the last two months of gestation. No cases of toxemias of pregnancy were used. The controls were of the same class, and were women of about the same age as the pregnant cases. None of the controls had fever, suppuration or malignant disease at the time of the injection. A few males were used, including the writers.

The results were not uniform. Positive reactions were obtained in both pregnant and nonpregnant cases. Nearly all cases reacted to some extent but some of the pregnant cases reacted less than the nonpregnant cases. On the whole, we are inclined to think that there might have been a slight balance in favor of the pregnant cases, but nothing of sufficient intensity to give it diagnostic weight. The general reaction was chiefly conspicuous by its absence. A few cases complained of headache and malaise, but the controls showed about the same reaction as the pregnant cases. We could detect none of the typical symptoms of anaphylactic reaction as reported by other authors who used other proteins in animals, and occasionally in man.

METHOD OF PREPARATION OF PLACENTAL PROTEINS FOR INJECTION.

All of the placentas used were fresh, and from full-term pregnancies. Immediately after delivery, the amnion and cord were dissected off, and cut into small pieces, washed thoroughly for three hours in running water, and squeezed repeatedly until no trace of hemoglobin could be detected.

Preparations made consisted of (1) whole placenta, (2) water soluble protein, (3) normal salt soluble protein, and (4) protein finally extracted with 0.5 per cent. solution of HCl in salt solution. Glycerine emulsion of each was also made.

TABLE I.

Showing the local skin reaction following intracutaneous injection of protein A (whole placental protein). Some local tenderness accompanied every case when there was an areola of redness exceeding approximately 0.6 cm. in diameter.

Case	Preg. or control	Amt. inject.	Local 24 hr.	Reaction after 48 hr.	72 hr.	Axill. tender.	Rem.
1	Preg. 7½ mo.	0.5 c.c.	Diffuse areola 2.5 cm. diam.	Same.	Reaction gone.	—	
2	Preg. 8 mo.	0.5 c.c.	Indistinct 1.5 cm.	0.5 cm. indistinct.	Reaction gone.	+	
3	Preg. 8 mo.	0.3 c.c.	Faint areola 1.5 cm.	0.3 cm. faint.	Reaction gone.	+	
4	Preg. 8 mo.	0.3 c.c.	Faint reaction 1.5 cm.	0.6 cm. faint.	0.4 cm. faint.	+	
5	Preg. 8 mo.	0.4 c.c.	Faint at edges 2 cm. diam.	0.4 cm. faint.	Reaction gone.	— +	
6	Not preg.	0.5 c.c.	Faint areola 2 cm. diam.	Faint 1.5 cm.	.....	+	Rheum. syphil.
7	Not preg.	0.5 c.c.	Very faint 1.8 cm. diam.	Barely visible.	Gone.	—	
8	Not preg.	0.3 c.c.	Faint 0.5 cm. diam.	0.2 cm.	Gone.	—	
9	Not preg.	0.3 c.c.	Faint areola 0.8 cm. diam.	0.7 diam.	Gone.	+	
10	Not preg.	0.5 c.c.	Faint 1 cm. diam.	1.1 cm.	Gone.	+	Male.
11	Not preg.	0.5 c.c.	Sharp and distinct, 1.5 cm.	0.4 cm. sharp	Gone.	+	Nephritis.

Whole placental suspensions were made in two ways: (A) After washing as above, the tissues were dehydrated and extracted with ether, dried at 50° C. and pulverized; (B) washed, dried at 50°

TABLE II.

Showing the local skin reactions obtained by the intracutaneous injection of Protein B (water soluble fraction of the placenta).

Case	Preg. or not	Amt. inject.	Local reaction		72 hr.	Axill. tend.	Rem.
			24 hr.	48 hr.			
12	Preg. 8 mo.	0.8 c.c.	Marked areola 2.5 cm. diam.	Marked 1.5 cm.	Gone.	+	
13	Preg. 8 mo.	0.8 c.c.	Distinct 2.7 cm.	Distinct 2.5 cm.	1.3 cm.	+	No gen. symptoms.
14	Preg. 8 mo.	0.7 c.c.	Definite areola 2.3 cm. diam.	0.8 cm.	.....	-
15	Not preg.	0.7 c.c.	1.1 cm. fairly distinct	Faint 0.7 cm.	.....	-
16	Not preg.	0.9 c.c.	Distinct at center, faint at edge 2.8 cm.	No change.	Gone.	Slight.	
17	Not preg.	0.8 c.c.	Very faint 1 cm. diam.	No change.	Gone.	- Slight.	
18	Not preg.	0.4 c.c.	0.5 cm. faint.	Gone.	.....	-

C, pulverized, and then extracted with ether for twenty-four hours at incubation temperature. Suspensions of these powders in a sterile 0.5 per cent. phenol normal salt solution were made, and after allowing the coarser particles to settle the supernatant fluid was used for injections.

The water soluble protein was made by grinding the thoroughly washed placental tissue with sand, and extracting twice for several hours at room temperature with distilled water under toluol. This was filtered and the filtrate gently heated until coagulation of the protein; the precipitated protein was dried at 50° C., pulverized, and suspended in a 0.5 per cent. phenol in normal salt solution. The residue from the water extracted placenta was ground, and extracted twice with normal salt solution for several hours.

TABLE III.

Showing local skin reactions obtained by the intracutaneous injection of Protein C (salt soluble fraction of the placenta).

Case	Preg. or control	Amt. inject.	Local reaction			Axill. tend.	Rem.
			24 hr.	48 hr.	72 hr.		
19	Preg. 9 mo.	0.8 c.c.	Faint areola 2.5 cm. diam.	1.7 cm. faint.	1.5 cm. faint.	—	Had baby on 2d day.
20	Preg. 8 mo.	0.5 c.c.	Diffuse edge 3.5 cm. d.	1.5 cm.	Gone.	+	
21	Preg. 8 mo.	0.4 c.c.	Faint and diffuse 3 cm. diam.	Faint 2.5 cm.	Faint 1.5 cm.	+	
22	Preg. 8.5 mo.	0.5 c.c.	Very faint 2.5 cm.	0.8 cm. sharp.	Gone.	—	
23	Not preg.	0.4 c.c.	Very faint 3 cm. d.	Faint 2.5 cm.	Gone.	+	
24	Not preg.	0.5 c.c.	Very faint 2.5 cm. d.	1.7 cm.	Gone.	+	
25	Not preg.	0.4 c.c.	Faint 1.5 cm. d.	Distinct 0.7 cm.	Gone.	—	
26	Not preg.	0.7 c.c.	Sharp and red 1.5 cm.	Distinct 0.6 cm.	Gone.	+	

The filtrate from this was heated carefully until the protein coagulated. The protein was dried, pulverized, and suspended in 0.5 per cent. phenol normal salt solution.

The acid soluble protein was extracted from the remains of the placenta after the water and normal salt solution extracts were made. A 0.3 per cent. HCl normal salt solution was used. The extraction was allowed to go on for three or four hours. The filtrate from this was neutralized with $n/10$ NaOH and the precipitate, dried, pulverized, and suspended in a 0.5 per cent. phenol salt solution.

All of these suspensions, and partial solutions were finally brought to 60° C. for forty minutes for sterilization.

TABLE IV.

Showing local skin reactions following intracutaneous injections of Protein D (acid soluble fraction of placenta; see technic of preparation). It is seen here that the reactions are slightly more marked in the controls than in the pregnant cases.

Case	Preg. or control	Amt. inject.	Local reaction			Axill. tend.	Rem.
			24 hr.	48 hr.	72 hr.		
27	Preg. 8 mo.	0.5 c.c.	Fairly def. 0.8 cm.	Barely visible.	Gone.	—	
28	Preg. 8 mo.	0.4 c.c.	Distinct 0.5 cm.	Barely visible.	Gone.	—	Practically no reaction.
29	Preg. 8 mo.	0.4 c.c.	Sharp 0.8 cm.	Barely visible.	Gone.	.....	Practically no reaction.
30	Not preg.	0.4 c.c.	Faint 1.5 cm.	Faint 0.5 cm.	Gone.	—	
31	Not preg.	0.5 c.c.	Faint 2 cm. d.	Faint 1 cm.	Gone.	—	
32	Not preg.	0.5 c.c.	Diffuse 1.5 cm. d.	0.5 cm.	Gone.	.....	Male.
33	Not preg.	0.9 c.c.	Definite 2.5 cm.	Definite 1.5 cm.	Slight.	.....

METHOD OF INJECTION.

Both subcutaneous and intracutaneous injections of the above suspensions were made besides Pirquet scarifications with the glycerine emulsions. The scarification inoculations were made in the usual manner with a Pirquet needle making control tests with glycerine, and also with scarification only. The subcutaneous injections were made just under the skin, using from 0.5 c.c. to 1.5 c.c. of the various suspensions.

The intracutaneous injections were made with a No. 26 hypodermic needle. Since local reactions from intracutaneous injections were very sensitive and varied with the amount of the suspended or dissolved protein. Extreme care was taken to inject an exactly equal amount in the pregnant as in the non-pregnant control persons.

SUMMARY.

Proteins prepared from the placenta in this way or whole placenta when introduced by the Von Pirquet intracutaneous or subcutaneous method, do in most cases cause a local reaction in pregnant and non-pregnant individuals. The difference in the reaction, however, is neither great nor constant enough to be of value in the diagnosis of pregnancy.

This speaks against the theory that the pregnant woman is specifically sensitized to placental proteins.

The lack of a general anaphylactic reaction also speaks against the view that the pregnant woman is in fact a sensitized woman.

We realize that the method of preparation of the proteins is open to the objection that our manipulations may have so changed the substrate that the specific ferments could no longer attack it and break it down. That may be true, and yet other proteins capable of sensitizing and producing anaphylactic shock can be handled in a similar manner; and retain their specificity as shown by Vaughn, Wells, and others.

We wish to thank the members of the Attending, and House Staffs of the Cook County Hospital for free access to the clinical material used in this work.

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EXPERIMENTS ON THE ETIOLOGY OF ECLAMPSIA.*

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(With thirteen illustrations.)

THE investigations which have been undertaken in the attempt to determine the etiological factors in eclampsia have brought forth so many apparent contradictions that our present knowledge of the condition may justly be called fragmentary. In fact, eclampsia has more than once been called the disease of many theories. Within the past half century the etiological factor has been attributed to (a) uremia; (b) ammonemia; (c) bacterial invasion; (d) changes of various types in vascular tension; (e) mammary toxemia; and (f) anaphylaxis. Another theory, more generally accepted at the present time, is that first proposed by Rivière, (1) that the condition is due to an intoxication. The possible sources of this intoxication are either maternal or fetal, and of the various fetal structures the placenta, the fetus itself, or the decidual elements circulating in the blood stream, have singly or in combination been held responsible.

Wells(2) regards it as improbable that one definite chemical substance is responsible for the pathological changes in eclampsia. He is of the opinion that there are present, not only the toxic substances which originate the change, but also protein fractions which accumulate because of disorganization of the liver and kidney.

The pathological lesions center for the most part about the liver and kidneys. The hepatic changes may vary from cloudy swelling and scattered hemorrhages to focal necrosis and thrombosis, and in advanced cases to more or less complete autolysis of the entire organ. It has been maintained that the scattered subcapsular hepatic hemorrhages and thrombi are the only characteristic lesions and that without them no diagnosis of eclampsia should be made. Others have considered the hemorrhages as a sequel to the high blood pressure and convulsions. The kidney changes, which may be slight or

* From Columbia University, George Crocker Special Research Fund, F. C. Wood, Director, and the Pathological Laboratory, Lincoln Hospital, New York. Although this problem is not one directly connected with cancer investigation, the experimental portion of the work was carried on at the Crocker Laboratory, as it is part of a larger study now being pursued by one of us (G. L. R.) on the action of chemical stimulants on cells.

Read before the Alumni of the Sloane Hospital.

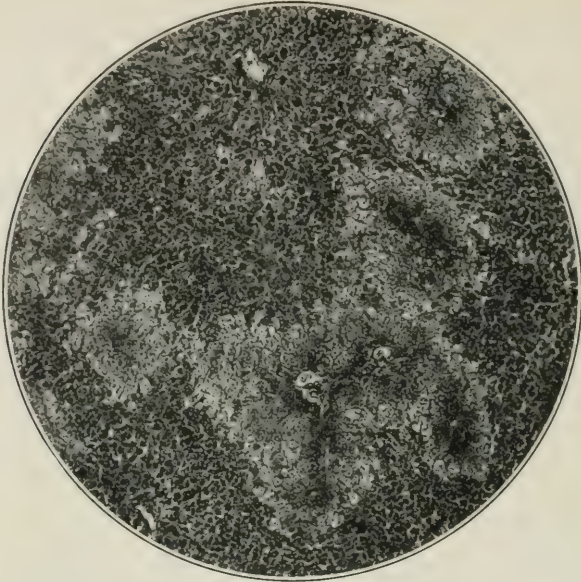


FIG. 1.—Liver, human eclampsia, showing focal necrosis.



FIG. 2.—Kidney, human eclampsia, showing acute parenchymatous lesion.

marked, are those of an acute degeneration and include swelling and necrosis of the cells of the glomeruli and secreting tubules. Typical examples of the lesions in both liver and kidney are shown in Figs. 1 and 2.

During pregnancy fetal protein elements (chorionic villi) enter the maternal circulation, where they undergo digestion (whether by specific or nonspecific ferments is immaterial). Protein (peptone, fractions of snake venom proteids) as well as nonprotein products (chloroform) are known to produce lesions (see Fig. 3), and symptoms which in many ways closely resemble those of eclampsia, *e.g.*, edema, headache, muscular twitchings, generalized convulsions, liver and kidney necrosis, thrombosis, and hemorrhage. Our working hypothesis, that eclampsia is due to an excess in the maternal circulation of the products of digestion of fetal protein, was based on these facts.

We assumed in our experiments that the autolysis of tissue would produce substances resembling those resulting from ferment action in the blood, since both hydrolize complex proteins to the simpler amino acids. Autolysates of (1) rabbit placenta; (2) rabbit fetus; (3) rabbit fetus with placenta and membranes; (4) adult rabbit liver and kidney, were prepared in the following manner: The tissue was ground up and mixed with three times its bulk of physiological saline, covered with toluol, placed in the incubator at 37° C. for five days, and finally passed through a Berkefeld filter. The Berkefeld filtrate was tested for sterility by culture and preserved under toluol.

These autolysates were injected intravenously or subcutaneously in varying doses over varying periods of time, in a fairly large series of animals, males and nonpregnant and pregnant females being included in the group. Some of the animals died, some were killed with ether, while others were exsanguinated, the blood serum being tested for protective ferments. Autopsies were performed in every instance and microscopical examinations were made of the liver and kidney and such other organs as showed gross changes; the pathological changes will be described in detail on a subsequent page. The details of the protocols are given in Table I.

In our next series of experiments we attempted to overload the organism with fetal protein in which the intracellular ferments had been killed. Six rabbit fetuses with their placenta were ground up and diluted with three times their bulk of physiological saline; the mixture was brought to the boiling point for one minute, and then covered with toluol. The sterility of this mixture was controlled by culture. Subcutaneous injections were given, the animals being

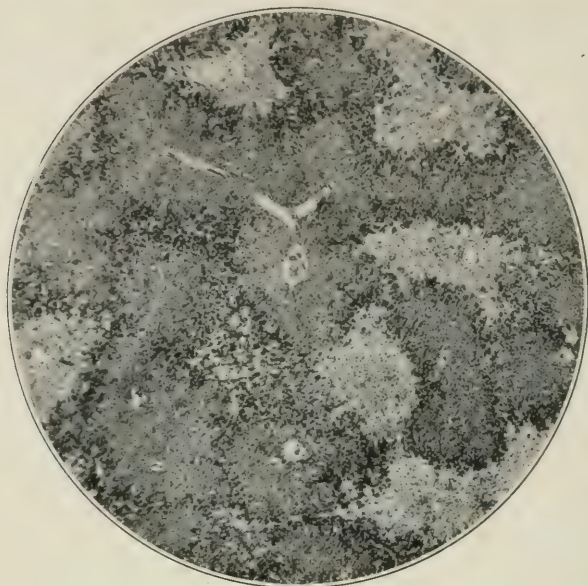


FIG. 3.—Liver, dog, after two hours chloroform anesthesia showing focal necrosis.

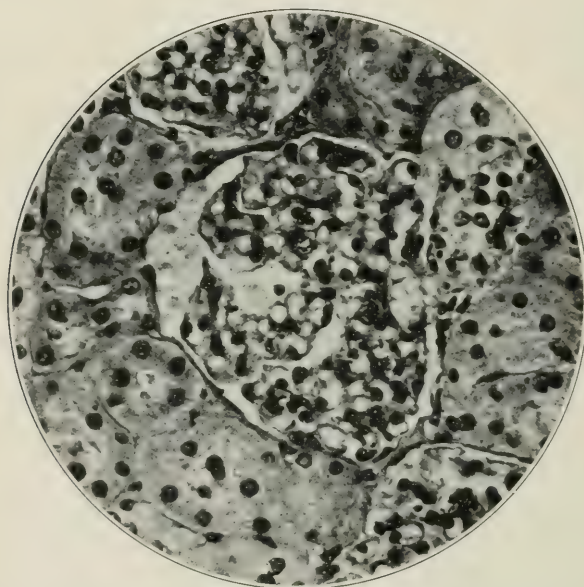


FIG. 4.—Kidney, rabbit, showing glomerular lesion after injection of boiled fetal cells.

killed at definite intervals and the blood serum tested for protective ferments. The fifth injection was given at 10 A. M. On the following

TABLE I.

Sex	Type of autolysate	Dose, number, and mode of administration		
Fp.	Fetal	5 c.c.	4 intrav.	K 7 days after first injection
F	Fetal	5 c.c.	4 intrav.	K 7 days after first injection
M	Placental	6 c.c.	4 intrav.	K 7 days after first injection
Fp.	Placental	6 c.c.	4 intrav.	K 7 days after first injection
F	Placental	6 c.c.	4 intrav.	K 7 days after first injection
M	Fetal and Placental	10 c.c.	14 subq.	K 16 days after first injection
F	Fetal and Placental	10 c.c.	14 subq.	K 16 days after first injection
Fp.	Fetal and Placental	10 c.c.	14 subq.	K 16 days after first injection
Fp.	Fetal and Placental	10 c.c.	14 subq.	K 16 days after first injection
Fp.	Fetal and Placental	10 c.c.	14 subq.	K 16 days after first injection
F	Fetal and Placental	10 c.c.	14 subq.	K 16 days after first injection
Fp.	Fetal and Placental	10 c.c.	14 subq.	K 16 days after first injection
Fp.	Fetal and Placental	10 c.c.	14 subq.	K 16 days after first injection
Fp.	Fetal and Placental	10 c.c.	14 subq.	K 16 days after first injection
F	Fetal and Placental	10 c.c.	14 subq.	K 16 days after first injection
M*	Fetal and Placental	2 c.c.	1 subq.	K 1 day after first injection
M*	Fetal and Placental	2 c.c.	1 subq.	K 1 day after first injection
F	Fetal and Placental	2 c.c.	1 subq.	D 1 day after first injection
F*	Fetal and Placental	2 c.c.	2 subq.	K 3 days after first injection
F*	Fetal and Placental	2 c.c.	2 subq.	K 3 days after first injection
F	Fetal and Placental	2 c.c.	4 subq.	D 5 days after first injection
F*	Fetal and Placental	2 c.c.	4 subq.	K 5 days after first injection
M*	Fetal and Placental	2 c.c.	4 subq.	K 5 days after first injection
M*	Fetal and Placental	2 c.c.	5 subq.	K 8 days after first injection
M*	Fetal and Placental	2 c.c.	5 subq.	K 8 days after first injection
M*	Fetal and Placental	2 c.c.	5 subq.	K 8 days after first injection
M*	Fetal and Placental	2 c.c.	5 subq.	K 8 days after first injection
M*	Fetal and Placental	2 c.c.	6 subq.	K 9 days after first injection
M*	Fetal and Placental	2 c.c.	6 subq.	K 9 days after first injection
M*	Fetal and Placental	2 c.c.	6 subq.	K 9 days after first injection
F*	Fetal and Placental	2 c.c.	6 subq.	K 9 days after first injection
M*	Fetal and Placental	2 c.c.	7 subq.	K 10 days after first injection
M*	Fetal and Placental	2 c.c.	7 subq.	K 10 days after first injection
M*	Fetal and Placental	2 c.c.	7 subq.	K 10 days after first injection
F*	Fetal and Placental	2 c.c.	7 subq.	K 10 days after first injection
Fp.*	Fetal and Placental	2 c.c.	7 subq.	K 10 days after first injection
Fp.	Liver and Kidney	3 c.c.	1 intrav.	D 1 day after first injection
M	Liver and Kidney	3 c.c.	2 intrav.	D 2 days after first injection

Explanatory note.—F, female, Fp., pregnant female, M, male, K, killed, D., died.

* Serum taken for protective ferment examination. Intrav., intravenous injection. Subq., subcutaneous injection.

TABLE I.—(Continued.)

Sex	Type of autolysate	Dose, number, and mode of administration		
F	Liver and Kidney	3 c.c.	2 intrav.	D 2 days after first injection
M*	Liver and Kidney	2 c.c.	1 subq.	K 1 day after first injection
F*	Liver and Kidney	2 c.c.	1 subq.	K 1 day after first injection
F*	Liver and Kidney	2 c.c.	3 subq.	K 4 days after first injection
F*	Liver and Kidney	2 c.c.	3 subq.	K 4 days after first injection
F*	Liver and Kidney	2 c.c.	5 subq.	K 6 days after first injection
M*	Liver and Kidney	2 c.c.	5 subq.	K 6 days after first injection
Fp.*	Liver and Kidney	2 c.c.	6 subq.	K 9 days after first injection
F*	Liver and Kidney	2 c.c.	6 subq.	K 9 days after first injection
M*	Liver and Kidney	2 c.c.	6 subq.	K 9 days after first injection
Fp.*	Liver and Kidney	2 c.c.	6 subq.	K 9 days after first injection

Explanatory note.—F, female, Fp., pregnant female, M, male, K, killed, D., died.

* Serum taken for prosective ferment examination. Intrav., intravenous injection. Subq., subcutaneous injection.

day the laboratory assistant noted that five of the surviving animals were in coma and were having occasional localized, as well as general, convulsions. During that day three of the animals died. Two days after the injection, more of the animals were unconscious and in convulsions. Four of the animals, though not unconscious, were obviously very sick, and were therefore killed. The gross findings, which included lesions in the brain and spinal cord, were intense congestion of the liver and kidney, and occasionally of the brain. There were larger and smaller subcapsular hemorrhages in both liver and kidney. No bacterial infection of the boiled cells was demonstrable. The details of the protocoll are given in Table II.

The bibliography of the protective ferments characterizing pregnancy contains many references to the behavior of these substances in eclampsia. The general tenor of the various reports is that the Abderhalden test is either weak or negative. We have followed most minutely the details of the dialysis method as given by Abderhalden(3). In a series of sixty normal pregnancies the test has been uniformly positive, though we have had positive results with placental substrat in cases known to be nonpregnant. In eight eclamp-tics it was negative, in three positive. In five cases of toxemia of pregnancy (pernicious vomiting, albumin in urine) it was negative on the first examination but became positive upon improvement of the condition under treatment. In two toxemic cases where the symptoms improved markedly under treatment the reaction remained negative; one of these developed eclamptic symptoms at the seventh month.

TABLE II.

Sex	Number and dose of injections	
M	1 2 c.c.	D 1 day after first injection
M*	2 2 c.c.	K 3 days after first injection
M*	2 2 c.c.	K 3 days after first injection
M*	3 2 c.c.	K 4 days after first injection
F*	3 2 c.c.	K 4 days after first injection
M*	4 2 c.c.	K 5 days after first injection
F*	4 2 c.c.	K 5 days after first injection
F	5 2 c.c.	D 6 days after first injection in convulsions
M	5 2 c.c.	D 6 days after first injection in convulsions
Fp.	5 2 c.c.	D 6 days after first injection in convulsions
M	5 2 c.c.	D 6 days after first injection in convulsions
M	5 2 c.c.	D 6 days after first injection in convulsions
M	5 2 c.c.	D 6 days after first injection in convulsions
F*	5 2 c.c.	K 7 days after first injection
M*	5 2 c.c.	K 7 days after first injection
F*	5 2 c.c.	K 7 days after first injection
M*	5 2 c.c.	K 7 days after first injection
M	5 2 c.c.	D 7 days after first injection in convulsions
F	5 2 c.c.	D 7 days after first injection in convulsions
F	5 2 c.c.	D 7 days after first injection in convulsions

Note.—The same value is attached to the symbols as in Table I.

In our animal experiments the protective ferment reaction has given rather confusing results. If pregnant animals be excluded, digestion of rabbit placental albumin did not occur when boiled fetal and placental cells were injected. With autolyzed liver and kidney tissue injections, one male serum digested placental albumin after the animal had received six injections. The introduction of autolyzed fetal and placental tissue resulted in digestion of placental albumin in four instances, two in each sex, after three and four injections respectively. Our small numbers preclude any positive assertions, but our results suggest that the so-called protective ferments are, perhaps, not elaborated by the leukocytes, but represent the intracellular ferments of cells which have died from some cause not affecting their ferments. It is singular that boiled cells should give consistently negative results, while autolyzed tissue should give positive and nonspecific results. Why the reaction should be positive only for a short period is at present a matter of speculation. The data of the experiments are given in Table III.

The pathological lesions of the liver and kidney are of interest. In the group injected with boiled cells, the most marked changes

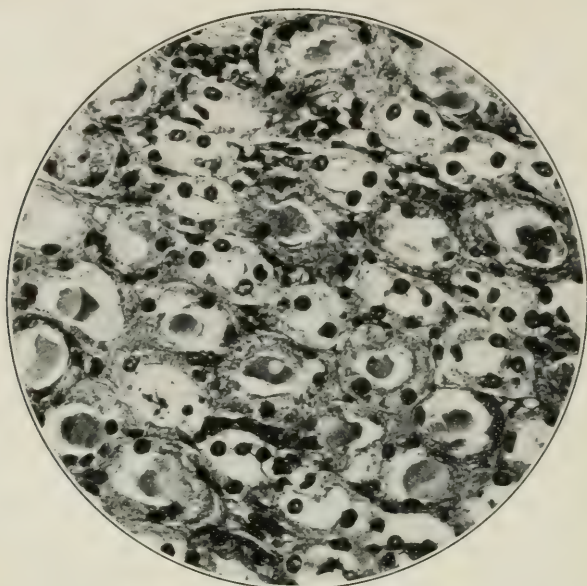


FIG. 5.—Kidney, rabbit, showing tubular lesions after injection of boiled fetal cells.

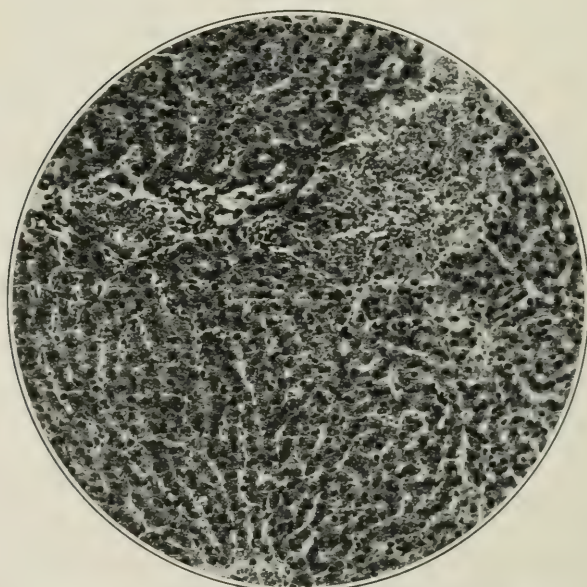


FIG. 6.—Liver, rabbit, showing areas of hemorrhage after injection of boiled fetal cells.

occurred in the kidney. As early as one day after injection, the cells of the secreting tubules were swollen and the vessels were moderately congested; the swelling progressed to fragmentation and the formation of many casts in the tubules. The glomeruli were the last to become involved but these also, especially in the animals dying in convulsions, were markedly congested, and showed fragmentation of the cells with a deposit of albumin in the glomerular channels (Fig. 4). Small scattered hemorrhages arising from ruptured capillaries were present, and a few of the smaller blood-vessels were thrombosed. In kidneys previously the site of a chronic interstitial change, the lesions were extremely marked, the entire organ being markedly degenerated in one instance. While hepatic changes of the type described in the succeeding paragraph did occur, the more usual lesion was an intense congestion with scattered small hemorrhages, some of which were subcapsular. Thrombi were occasionally encountered. Typical hepatic and renal lesions are shown in Figs. 5 and 6.

When ferment active substances, that is, either kidney or liver autolysates, or fetal and placental autolysates, were introduced, the most marked changes occurred in the liver. The initial change, occurring as early as one day after injection, was an inflammation of the wall of the smaller blood-vessels, followed by the formation of a thrombus, which thrombus was often hyaline in character. Subsequent to this there occurred cloudy swelling, degeneration, and autolysis of the cells about the vessel, the peripheral cells of the lobule remaining unaffected provided the adjacent central vein was not thrombosed. The irregularity of the thrombosis produced the picture of focal necrosis. With large doses (10 c.c.) or continued treatment, the focal character of the lesions disappeared, and a general autolysis of the organ occurred. Suitable staining methods demonstrate that but a slight part of the degeneration noted was fatty. Congestion of the vessels and hemorrhage were not frequent. Occasionally the liver showed but slight change, the kidney bearing the brunt of the attack; as a rule, however, the renal lesions were slight as compared with those in animals injected with boiled cells. The lesions were much more marked in pregnant animals. The various phases of the process are shown in Figs. 7, 8, and 9.

During the course of our experiments one of our untreated rabbits was found unconscious, with localized convulsions. This animal, a pregnant female near term, showed the typical hepatic changes previously discussed, and a marked parenchymatous and interstitial nephritis. The lesions are shown in Figs. 10 and 11.

Of the twenty animals injected with boiled cells, fifteen showed

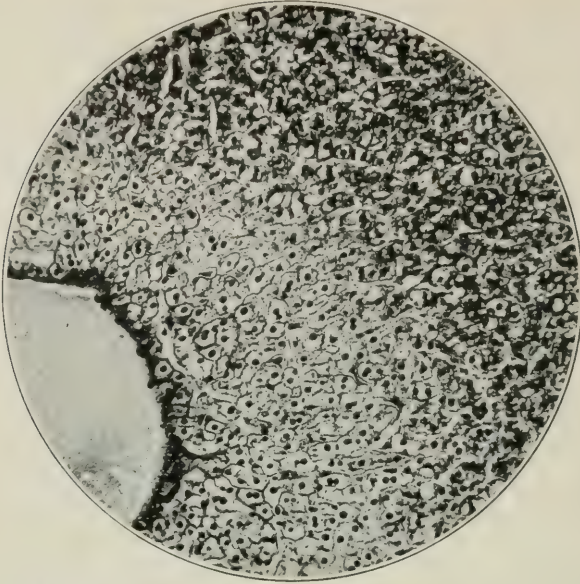


FIG. 7.—Liver, rabbit, showing progress of lesion from thrombotic vessel after injection of autolysates.



FIG. 8.—Liver, rabbit, showing as next step, zonal character of lesions following injection of autolysates.

some slight congestion and hemorrhage in the liver, and five showed commencing degeneration. Eighteen of the animals had marked renal lesions while in two the kidney lesions were insignificant.

In the group injected with autolysates, nine livers were in fair condition, forty were the seat of marked changes, while in the kidney thirty-three were slightly affected, and sixteen contained severe lesions.

In our final experiments we attempted to determine which product or products of autolysis were responsible for the lesions induced. Autolysis produces several simple amino acids of which one, leucin, is excreted in large amounts in eclampsia. It also produces dibasic amino acids and aromatic constituents, and of the latter, tyrosin, is also excreted in great abundance in the disease in question. The excretion of leucin and tyrosin is generally attributed to the destruction of the liver. Rats in groups of five were injected subcutaneously with five per cent. solutions or mixtures of one of the following products of autolysis, one injection of 10 c.c. being given in each instance; glycocoll, leucin, aspartic acid, xanthin, hypoxanthin, glutamic acid, tyrosin, skatol, indol, urea, asparagin, guanin, or sodium amido formate. The animals injected with leucin died within from three to seventy-two hours after injection; the others, killed ten days after the injection, showed no changes. The changes in the leucin group were those of a typical focal necrosis, thrombus formation, and hemorrhages in the liver, accompanied by an acute degeneration of the kidney. The lesion in the liver is shown in Fig. 12.

The experiment was next repeated with rabbits. Ten rabbits were given daily subcutaneous injections of a 2 per cent. leucin solution in doses of 10 c.c. for ten days. None of these animals showed lesions. Small doses continued for a considerable period proving ineffectual, six animals were given intravenous injections of one gram of leucin dissolved in water, the injections being repeated every second day, two animals being killed after the first injection, two after the second, and two after the third. The hepatic lesions, as shown in Fig. 13 are typical of those previously described. Focal necrosis was not encountered, the lesions having progressed beyond that stage. The renal changes were extremely slight and for all practical purposes could be disregarded.

To summarize our experiments and to apply them to the interpretation of the etiology of eclampsia: Bacterial disease and intentional injection excepted, pregnancy is the only condition in which complex protein material is introduced into the general circulation parenterally.

1. Ferment active homologous protein when introduced parenterally, induces extensive degeneration of the liver, and, as a rule,

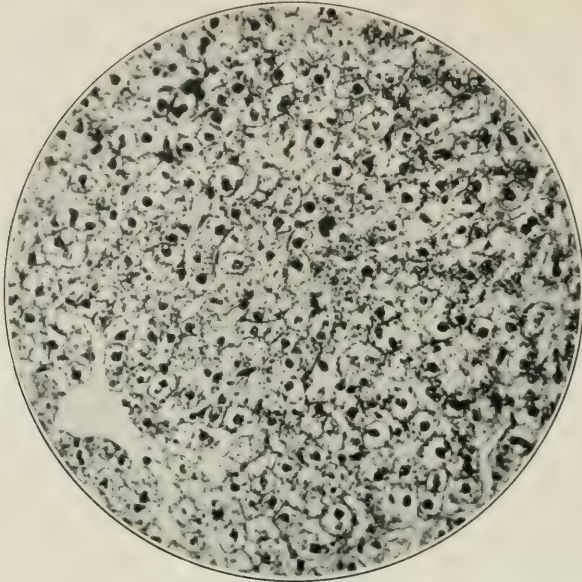


FIG. 9.—Liver, rabbit, showing complete destruction of parenchyma after injection of autolysates.

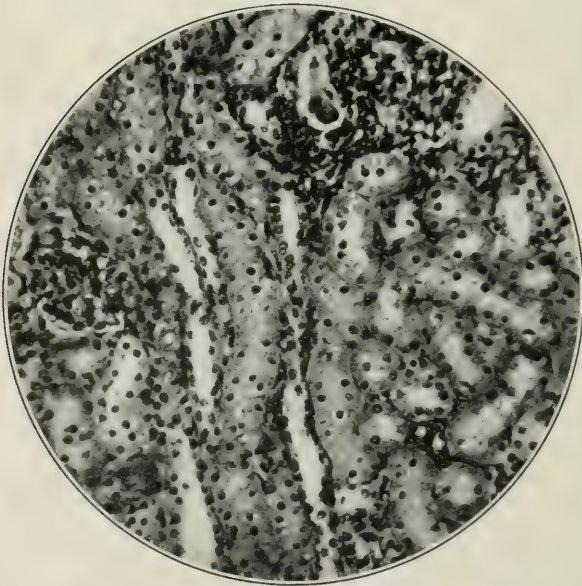


FIG. 10.—Kidney, rabbit, non-injected animal dying in convulsions.

TABLE III.

Sex	Material injected	No. of injections	Digestion of placental albumen
Fp.	None	None	Positive
M	Boiled fetal and placental tissue	1	Negative
M	Boiled fetal and placental tissue	1	Negative
M	Boiled fetal and placental tissue	2	Negative
F	Boiled fetal and placental tissue	2	Negative
M	Boiled fetal and placental tissue	3	Negative
Fp.	Boiled fetal and placental tissue	3	Positive
F	Boiled fetal and placental tissue	5	Negative
M	Boiled fetal and placental tissue	5	Negative
F	Boiled fetal and placental tissue	5	Negative
F	Boiled fetal and placental tissue	5	Negative
M	Boiled fetal and placental tissue	5	Negative
M	Liver and kidney autolysates	1	Negative
F	Liver and kidney autolysates	1	Negative
F	Liver and kidney autolysates	3	Negative
F	Liver and kidney autolysates	3	Negative
F	Liver and kidney autolysates	4	Negative
M	Liver and kidney autolysates	4	Negative
Fp.	Liver and kidney autolysates	6	Positive
M	Liver and kidney autolysates	6	Positive
Fp.	Liver and kidney autolysates	6	Positive
F	Liver and kidney autolysates	6	Negative
Fp.	No injection	None	Positive
M	Fetal and placental autolysates	1	Negative
M	Fetal and placental autolysates	1	Negative
F	Fetal and placental autolysates	2	Negative
F	Fetal and placental autolysates	2	Negative
F	Fetal and placental autolysates	3	Positive
M.	Fetal and placental autolysates	3	Positive
F	Fetal and placental autolysates	4	Positive
M	Fetal and placental autolysates	4	Positive
M	Fetal and placental autolysates	5	Negative
M	Fetal and placental autolysates	5	Negative
M	Fetal and placental autolysates	5	Negative
M	Fetal and placental autolysates	5	Negative
M	Fetal and placental autolysates	6	Negative
M	Fetal and placental autolysates	6	Negative
M	Fetal and placental autolysates	6	Negative
F	Fetal and placental autolysates	6	Negative
M	Fetal and placental autolysates	8	Negative
M	Fetal and placental autolysates	8	Negative
F	Fetal and placental autolysates	8	Negative
Fp.	Fetal and placental autolysates	8	Positive
M	Fetal and placental autolysates	9	Negative
F	Fetal and placental autolysates	9	Negative
F	Fetal and placental autolysates	9	Negative
M	Fetal and placental autolysates	9	Negative

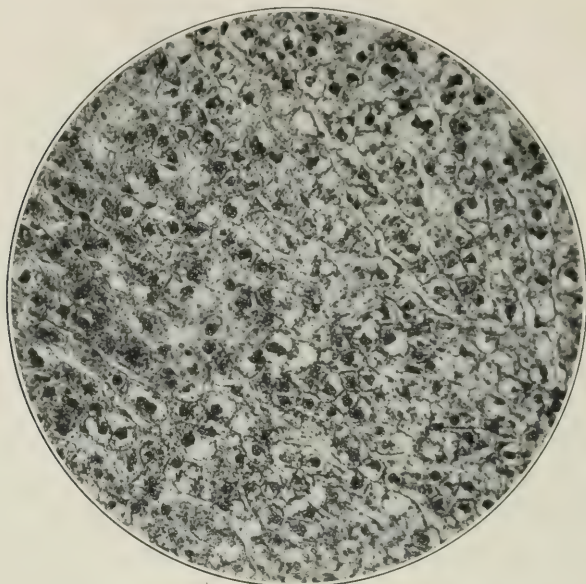


FIG. 11.—Liver, rabbit, non-injected animal dying in convulsions.

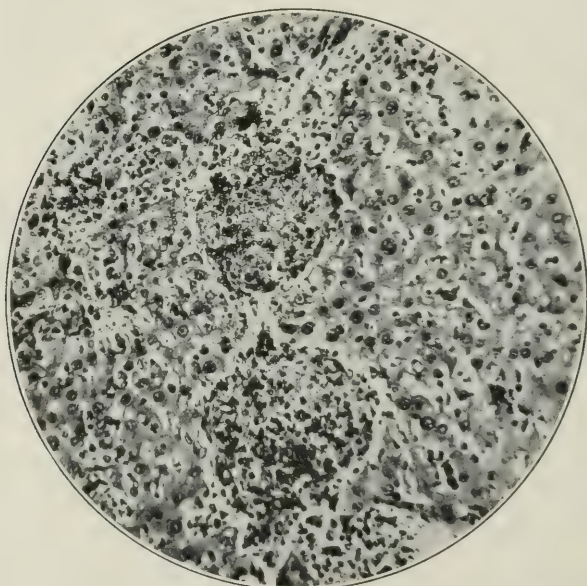


FIG. 12.—Liver, rat, showing focal necrosis after injection of leucin.

but slight degeneration in the kidney. These lesions probably are equivalent in the rabbit to those seen in the organs of the eclamptic human female.

2. Homologous protein, boiled to destroy the enzymes and then parenterally introduced, produces, as a rule, but slight lesions in the liver; it damages the kidney, however, to a very marked degree as evidenced by enormous quantities of albumin with all kinds of casts in the urine. The animals die in convulsions and coma, reproducing the symptoms of eclampsia in the human subject.

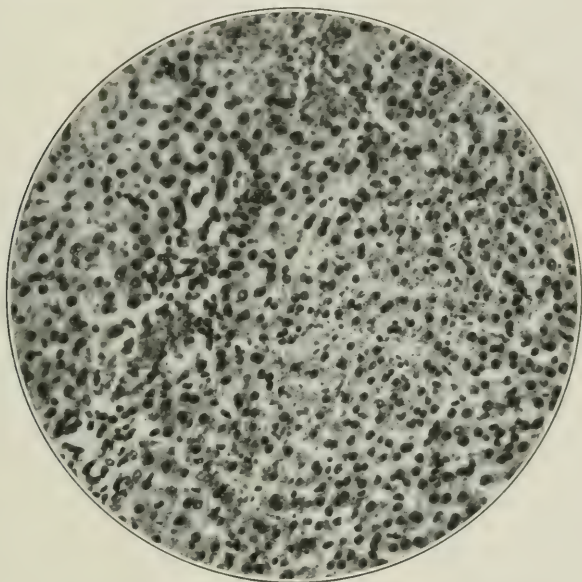


FIG. 13.—Liver, rabbit, showing lesion after injection of leucin.

3. Leucin, one of the products of autolysis, produces on injection a marked degeneration of the liver both in rats and rabbits. In the rat, degeneration of the kidney also is induced, though this does not occur in the rabbit. The boiled cells are killed before leucin can be formed, hence hepatic degeneration after their injection is a minimum.

From the facts stated above we believe that eclampsia develops in the following sequence. An overload of fetal elements is thrown into the circulation and, whether in the circulation or not, is autolyzed with the formation of an excess of leucin. The excess of leucin injures the hepatic vessels with consequent thrombosis, cloudy swelling, local necrosis, and more or less complete autolysis of the liver cells. The renal changes are probably due in part to other products of autolysis, and, perhaps, also to protein fractions incompletely broken down by the liver. The surprising feature of the

process is the extent to which the liver may be damaged experimentally before clinical symptoms appear in the animals. Judging from analogy, such may well be the case in the human subject. The hemorrhages and the convulsions are due in all probability not to extensive hepatic changes but to the renal lesions as shown in our experiments with boiled cells. It appears from our experiments that albuminuria is an important sign since severe renal degeneration seems to be the important lesion. The urines of our experimental animals contained enormous quantities of albumin and all varieties of casts even though there were but slight gross and microscopical changes in some of the kidneys. The experiments further suggest that a negative protective ferment in a known pregnant female and a determination of the leucin content of the blood will prove to be diagnostic procedures of value. It is possible that a negative reaction so frequently noted in eclampsia both in man and animals is due to the inhibition of the activity of the ferments by an excess of their own products.

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The President, CHARLES NORTON SMITH, M. D., in the Chair.

(Continued.)

RESECTION OF OVARIES.*

BY

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THERE is still too much difference of opinion in our ranks about follicular degeneration of the ovaries, as to its pathological status, its clinical importance and about the practical value of surgical efforts to preserve, reconstruct or improve such ovaries.

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Too many men still look upon the ovary as a surgical *nolle me tangere*, where no intermediate surgical measures have a place between doing nothing and amputation. It is a long time since that policy obtained in the treatment of joints; and yet it is certain that ovaries are fully as susceptible to surgical treatment and as much in need of it as joints are, even though they be objects of lesser importance. It is not rational to assume that in ovaries no other pain-producing conditions occur other than acute inflammation or gross destruction by suppuration or by neoplasms. Such a rule does not obtain in any other part of the body. As clinicians we are supposed to feel with our patients; and we become traitors to them if we lend an indifferent or incredulous ear to their complaints merely because the microscope, in the past, has often been unable to reveal whether certain presumably pathological conditions caused pain or not. Aside from a few mere theorists, the general view of all men, who know the most about such ovaries from clinical experience and hystological studies combined, is that these enlarged atresic Graffian follicles and persistent corpora lutea, are retention cysts that have been prevented from rupturing and discharging their contents, normally, by the excessive amount of connective tissue in their walls or in the stroma and tunic of the ovary. These persistently growing follicle cysts cause increased intracapsular pressure within the ovary, which causes pain here as it does in other sensitive tissues of the body, when affected in the same way.

In my experience this condition has nearly always been merely an adjunct or secondary disorder, associated with other more pronounced pathological conditions. Careful attention to it, however, contributes much toward better and more uniformly good subjective results that the patients derive from the aggregate of surgical procedures that they undergo. The cases of prolapse of one or both ovaries without displacement of the uterus are few, but when they do occur, this follicular degeneration is usually present or it will soon follow; and such ovaries are as much an indication for surgical relief as if they were the seat of neoplasms. The objections that have been raised to resection of such ovaries are theoretical and practical.

(1) *Theoretical* objections were first formally raised in 1886 by William Nagel(1) an assistant of Gusserow, in declaring that all these follicle cysts no matter how large, contained ova and must therefore be regarded as normal and not be molested. But Nagel's premises and conclusions were soon completely overturned by Bulius, Stratz, Bollenhagen, Steffeck, Von Kahlden, Popoff, Pettipierre, Hölzl, Pffannestiel, August Martin and others who each made more

exact and extended series of hystological investigations; and by eminent practical gynecologists like Von Winkle, Fehling, Fritsch, Gebhard, Hoffmeyer, Howard Kelly and others who have written about it. They have shown that Nagel jumped at unwarranted conclusions in trying to prove preconceived ideas; and he has never replied to the criticism that he received on this subject. Nagel's conclusion has since then been advocated with biased observations, by two others, under conditions that suggest chiefly a love for discord; while in 1904 an extensive series of hystological examinations of 180 such cases by Palmer Findley was published, who says: "The cysts varied in size from a pea to an English walnut, and in number from one to a score or more. These cysts, as Martin has pointed out, are not confined to the periphery of the ovary as is the case with ripened follicles, but are distributed throughout the stroma and may almost replace the stroma. On examination of these ovaries I have been astonished to note the scarcity of normal follicles with contained ova. In a few sections none were to be found and in nearly all they were fewer in number than would appear to be normal. The explanation probably lies in the atresia brought about by the addition of new connective tissue to the stroma, and its subsequent contraction. Hyaline degeneration is a prominent feature in nearly all sections. The walls of the blood-vessels, corpora albicantes, stroma and tunica albuginea all possess more or less of a hyaline deposit. This has been marked in the ovaries of young individuals. Congestion of the blood-vessels, while not constant, was a notable feature in almost all cases. Round-cell infiltration of the stroma was frequently observed." Findley says: "Numerous clinical and anatomical researches which have been made by competent observers prove the fallacy of Nagel's reasoning."

The practical objections to resection are: (a) That it is useless to remove follicle cysts, because, from the same cause more will form (R. F. Frank⁽²⁾) and (b) that the results are unsatisfactory, and reoperations become too frequently necessary (Hyde⁽³⁾ four in twenty-one cases, and Polack⁽⁴⁾ thirty-one in 200 cases). My further consideration of this subject will show that both of these statements are wrong: *First*, the usual cause of this follicular degeneration is a persistent venous hyperemia induced mostly by a downward displacement of the ovary, with or without a corresponding displacement of the fundus uteri. Correct surgical treatment eliminates this cause together with the resection. *Second*, that the results are not so discouraging, will appear from the experience of the majority of operators in this direction, and finally from my own results.

Importance of the Ovaries.—In order to weigh the merits of this procedure properly, it is important to note what loss of the ovaries means to the human female. Ovulation, with the object of reproduction, to comply with the demands of the state and to secure the happiness and physical development that maternity alone can bring, is one thing; but the other functions of the ovaries that are concerned solely with the physical and mental health and equilibrium of women is another thing, but of equal importance. Menstruation is not the indifferent or negligible process that exceptional opinions (Baldy(5)) would have it be. To preserve it in younger women, means to avoid the storm of distressing symptoms which are commonly associated with the anticipated menopause. It often means to avoid a wretched neurasthenia in young persons and a doleful melancholia in others. It helps very greatly, even when conception is no longer possible, to preserve the appearances of complete womanhood, to ward off domestic infelicity, and to hold a fair chance for matrimony and its legal perquisites still within reach of the patient. The internal secretion of the ovaries is an accepted fact, and it alone explains the following phenomena: Partly from clinical experience, partly from experiments upon lower animals (McIlroy,(6) Carmichael and Marshall(7) and others) and from at least four published cases of secondary abdominal operations (Holzbach(8)) and examinations of ovaries that were retained during previous hysterectomies, we know that the ovaries are needed, not only to obtain mature development of the genitalia and mammary glands at least, but also to save these organs from premature atrophy after their maturity; while on the other hand, the uterus and tubes may be removed, and the ovaries will still continue their functions. And they even figure in the general metabolism of the body if the statement of Richter is correct that the exchange of gases (oxidation) is less in castrated persons; and the statement of Pilcher that the excretion of lime in the urine is diminished by half and the excretion of phosphorus is increased, when the ovaries have been removed.

It is german to this subject to allude here briefly to a number of *pathologic liabilities of hydropic Graffian follicles and persistent corpora lutea*, that have been discovered or reaffirmed during the last decade. Hemorrhage from ruptured Graffian follicles and corpora lutea as one source of pelvic hematoceles is spoken of in the books of Carl Schroder, Pozzi, Nelaton and others that appeared before the lamented M. Saenger forcefully called attention to the predominance of tubal abortions as cause of these bleedings, in his classical paper on "The Active Treatment of Tubal Abortion" before the XI Inter-

national Congress at Rome in 1894. After that time extrauterine pregnancy, in some form, was regarded by many, if not most, gynecologists as the sole cause of pelvic hematoceles; and this is the prevailing opinion still. However, this is incorrect, as the following observations show:

First, cases of pelvic hematocele, some of the patients fainting from loss of blood, have been operated upon, usually, by abdominal section, with the probable diagnosis of some form of extrauterine pregnancy; and the source of the bleeding was found to be from a ruptured Graffian follicle. A. F. R. von Winnewarter,⁽⁹⁾ A. E. Neumann⁽¹⁰⁾ and Gabriel⁽⁴⁾ each report one such case, and Th. Holmes⁽¹²⁾ reports two cases. Jayle,⁽¹³⁾ Hannecart,⁽¹⁴⁾ Kossmann⁽¹⁵⁾ and Buerger⁽¹⁶⁾ operated for such pelvic hematoceles and found the bleeding to come from a ruptured ovarian hematoma; and the follicular multicystic degenerated ovary is held by them as the most probable predisposing cause. W. E. Lunzer,⁽¹⁷⁾ B. C. Hirst⁽¹⁹⁾ and Reinhard⁽²⁰⁾ have operated upon such cases and found the bleeding to come from a ruptured cystic corpus luteum. S. Savage⁽²¹⁾ reports six cases, arising from either ruptured Graffian follicles or corpora lutea. Reinhard reports one of such hemorrhage from a corpus luteum with an early tubal pregnancy, completely in tact, in the tube of the same side. Schauta⁽²²⁾ in two instances noticed large follicle cysts on an ovary while operating and left them alone. Some hours afterward he opened up the patients for evident internal hemorrhage and found it to come from those supposedly innocent follicle cysts which he had ruptured accidentally during the first operation. Pilliet⁽²³⁾ ascribes these ovarian hemorrhages to the small cystic degenerated ovaries, and corpora lutea in sclerocystic ovaries. He says: retrogression in these vulnerable bodies does not proceed normally, but is diverted to cystic formation which predisposes to bleeding.

Cases of death from ovarian hemorrhage are recorded by Scansoni,⁽²⁴⁾ Hewitt,⁽²⁵⁾ Bandel⁽²⁶⁾ and by Penn;⁽²⁷⁾ and it was found to be the cause of death at postmortem, by Raquet,⁽²⁸⁾ Denonvilliers,⁽²⁹⁾ Puech⁽³⁰⁾ and by Caremee.⁽³¹⁾ Many of these observers state that these ovarian hemorrhages occur during times of greatest vascular engorgement, as near the menstrual period, and are induced by exertion and excitement. Bartel and Hermann⁽³²⁾ made histological examinations of the ovaries of 119 individuals who bore stigmata of the status thymico-lymphaticus. They found that 58 per cent. of these ovaries were larger than the average, even to a length of 8.5 cm. as compared with a normal maximum of 4 cm.

They had a thickened coat of dense fibrous tissue and a strikingly smooth surface, devoid of normal ovulation wrinkles, to the end of sexual maturity, in 63 per cent. Their increased size was due to the large number of atresic follicles, varying in size from a pea to a hazel nut, that were either grouped in the poles, or were distributed throughout the thickened subcortical layer. They say that corpora lutea were scarce and that Nagel's dictum about healthy ova in the follicles is false.

Anna Poetzl(33) under the head of small cystic degeneration of ovaries as a probable cause of uncontrollable uterine hemorrhages, made the following observations: Two years previously she had determined by very many blood counts made in numerous women at various periods in their life, that, normally, a marked rise of red blood cells occurs just before menstruation and a fall in their number soon after it—not due to the loss of blood. She made these counts also in various abnormalities, and reports four young nulliparous women from nineteen to twenty-eight years of age, with no traceable pelvic lesion, nor any constitutional condition to account for very severe metorrhagia, occurring periodically, every two months to two years, so severely that danger to life was imminent and death did ensue in one case. It was found by operation, and in one case by autopsy, that small cystic degeneration of the ovaries was present in each one. In one of these cases, a nurse, blood counts had been made during several years and it was found that the normal rise and fall of erythrocytes before and after menstruation did not occur, but a condition of hyperglobulia of irregular order existed. A curetment was first made in this patient with amenorrhea following for two months, but without improvement in her anemic and generally impoverished condition. Both ovaries were then removed, with immediate and the most striking improvement in the blood findings, state of nutrition, strength and subjective feeling, and without a trace of climacteric symptoms. She supports her theory by the declaration of veterinarians that a "bawling sickness" in cows, which sometimes leads to a cachectic condition and occasionally to death, is caused by follicular degeneration of the ovaries; and that the condition may be relieved by crushing such ovaries, and cured by removing them. She says this condition causes sterility in both human and other females.

Experience and Resulting Opinions.—W. C. Seelye(34) in twenty-one patients, resected one ovary in ten, both ovaries in five, and removed one and resected the other ovary in six of them. The patients were young sterile women with severe dysmenorrhea. All except one

were immediately and permanently relieved of severe dysmenorrhea and obtained painless intervals between periods. He says abdominal section for dysmenorrhea should be more frequently done; and that a better classification should exist, showing what the indications are in given cases.

J. E. Cannaday⁽³⁵⁾ says the menopause induced in younger women is distressing. A knowledge of no ovaries is frequently a source of mental disturbance and melancholia. When large follicles are distributed through the ovary, he splits it open, dissects out the follicles and unites the lateral portions with catgut. He says that in cases of larger cystic neoplasms a portion of the wall, bearing follicles near the pedicle, can sometimes be dissected out, rolled up and stitched like a sausage, in connection with the pedicle. He says: "I have practised conservative surgery in over fifty cases of ovarian and tubal disease, and as far as I have been able to follow my cases, the symptomatic results have been good. There have been no recurrences of tubal trouble. A very small number of cases of cystic ovaries has come to secondary operation for removal of recurrent cysts. Several pregnancies have followed resection of ovaries, but I have no record of a case of pregnancy following plastic work upon the tubes." B. M. Emmet⁽³⁶⁾ says this form of ovarian degeneration is caused by chronic inflammation and also by too frequent or too intense pelvic hyperemia, as occurs in sexual excess, unsatisfied desire, prevention of conception, suppression of menstruation from any cause, etc. He likewise recommends incising ovaries bearing multiple atresic follicles and closing the incision with fine catgut after the cystic follicles have been enucleated or dissected out. W. P. Manton⁽³⁷⁾ resected both ovaries in seventeen cases, and one in twenty-nine patients. He punctured both ovaries in twenty-two cases and one in an equal number. In nineteen cases, one ovary was removed. Eighty-five per cent. of the married women and 75 per cent. of single patients were well one year after operation. In three cases he removed an ovary secondarily for recurrent cystic formations. He considers his results as satisfactory, and much better than total removal in view of the dual function of the ovary.

Edward Reynolds⁽³⁸⁾ bases his views in favor of resection upon twenty-nine closely observed cases. He says when one ovary is good and the other badly cystic, remove the latter. When one is less and the other more cystically degenerated, resect the better one first and if a fairly good ovary results, remove the worse one; but if a crippled one only results, resect the worse one also. Follicle cysts on the surface can be punctured and their lining peeled out.

Corpus luteum cysts can often be extruded by pressure alone between the fingers. The remaining wounds he says, if not large will often contract and need no stitching. Also, from the wall of larger cysts it is often possible to save and reconstruct some of the expanded portion of ovary in the cyst wall, into a new one, by folding it upon itself. He has treated enlarged sclerotic ovaries with circular and cross-incisions; and whenever mere flaps remained, he has folded them up and held them by linen or silk ligature passed around the roll. He claims such ligatures to be as innocent as absorbable material. In this one point, and this one point only, as to nonabsorbable ligatures, I must differ with Reynolds positively. He regards the enlarged polycystic ovaries as the least auspicious for resection, but correctly advises the saving of a part of one when both are diseased. I would simply add that, securing such a remnant with its circulation unimpaired along with the fundus uteri well up out of the small pelvis, will prevent recurrence of the follicular degeneration. Palmer Findley and J. Clarence Webster, out of a total number of 180 cases in which resection occurred, reported the largest and most instructive existing collection of thirty-nine cases operated for resection of ovaries only or solely. "In every case pelvic pain was complained of. Tenderness was almost always elicited by pressure upon the affected ovaries. In eighteen of the thirty-nine cases there was dysmenorrhea, and in most of these cases the pain preceded the appearance of the flow and continued throughout the period." They together followed up and reported the results of forty cases of which the laboratory records show that nothing but ovarian tissue was removed, and found that four cases were reoperated for removal of the ovaries that had been resected; while thirty-six were successful.

My Own Cases.—During the past six months I have conducted a persistent and very laborious inquiry, to find out the remote results of this operation, upon patients on whom it was incidentally (in each case) performed during the years 1907, 1908, 1909, 1910, 1911 and 1912. The total number of cases recorded is 151. Two other physicians and I succeeded in examining sixty-eight of them in from two to five years after operation. Inasmuch as the resection of one or both ovaries was done, in a large majority of cases, as an adjunct to some surgical procedure for correcting a faulty position of the uterus, which is of prime interest for the welfare of the ovaries; therefore "position" of the uterus and ovaries together was noted first, and secondly the "condition" of the ovaries together with the symptoms that might arise from them. When a patient, with full working or business capacity, would have minor pains during menstua-

tion and merely slight indispositions from these parts, such women do usually not consult a doctor. They would be classed as "good" or "cured." Patients whose symptoms from these organs began to curtail their full business or working capacity, so that they would sometimes rest from duty, as during menstruation, or consult a doctor, they were classed as "relieved" only. And when such disability or ailment from this source was a daily or constant occurrence they were classed as "failures." Fifty-five of the examined cases were found to be with *position and condition good*; fourteen of them had both ovaries resected. Four of them have had a child since the operation, and one has had two children.

Ten of the examined cases were found with *position good*; but were classed as *relieved* only. Three of these had both ovaries resected. One girl was a neurasthenic with melancholic disposition when she was brought to me with congenital retroversion and a cystic descended ovary. Four years later the position of the parts was good and the condition fair; but she is classed as a failure because of a steady decline in her mental condition. The two remaining cases examined were reoperated recently, not for anything wrong with their ovaries, but in one a hysterectomy was done for a troublesome chronic metritis, her one remaining ovary being retained; and in the other one, also with only one ovary left, a resuspension of the uterus by the round ligaments was made for recurrence of retroversion, after two forceps deliveries and one septic puerperium intervened.

In twenty-five patients examinations could not be had; but detailed information was obtained about their subjective condition in answers, either to verbal questions or to an extensive question-sheet, by letter. In four of this number both ovaries were resected and, likewise, four of them had a child. In nineteen of this number the reported condition of health warranted them to be classed as *cured*; while five were classed as merely *relieved*, and one as a *failure* because she reports that another operation was performed (not stating for what) and that she is still not well. One death occurred among these ninety-four total cases from peritonitis due to an unobserved puncture of the bladder, while ligating varicose veins in the broad ligaments, in connection with resection of ovaries, removal of appendix, and round ligament suspension of the uterus.

While half hour daily douches at 110 to 120° F., in recumbent posture, were freely advised for those classed as *relieved* and a smaller number of them were also treated by vagino-abdominal applications of the galvanic current (40 to 75 milliamperes) in

seances of thirty minutes each, once a week, in no case has a resected ovary required surgical treatment subsequently.

That multicystic follicular degeneration of ovaries and persistent cystic corpora lutea are pathological can no longer be reasonably doubted. Several large follicles bulging forth from the surface of an ovary of normal consistence, with a fair prospect of rupturing, must, of course, be regarded as normal; but when numerous cystic follicles from 1 cm. in size upward are in evidence beneath the surface and distributed throughout the stroma, they should be regarded as pathological, especially when the tunica albuginea is dense, the consistence of the ovary tense and its outline inclines to globular form.

Causes are chronic inflammation of infectious origin with or without active hyperemia as from excessive venery, incomplete coitus, masturbation, suppression of menstruation from a cold or from a mental trauma, etc.; or connective-tissue hyperplasia from persistent passive hyperemia which is induced in these parts by constipation, vicious dress, sedentary employment, etc., but above all things, by descensus or prolapse of the ovary caused by uterine displacement. (See C. H. Stratz, (39) and "The Fate of Ovaries in Connection with Retroversion and Retroflexion of the Uterus," Goldspohn(40).)

Treatment.—(a) Remove general causes by ferreting out contributory evil habits of living and any harmful features in employment, and point them out for correction. (b) Relieve the ovary of its tension by enucleating or dissecting out the growing cystic follicles by a most careful technic; and then secure it in an elevated position with and upon the broad ligament well drawn out of the small pelvis, preferably by some form of transplantation of the round ligaments into the abdominal wall. Care must be taken not to impede its circulation. The principal cause—venous engorgement—now having been removed, follicular degeneration will usually not recur.

The indication for this treatment is governed by the age, general health, occupation, social and economic relations, and by the wishes of the patient. With Reynolds, I would say "From puberty to maturity the tide of sexual life is rising. To dam it suddenly spells a neurasthenic catastrophe in a high percentage of cases." From twenty-five to thirty-five the tide is full and just as important; but not so many wrecks follow removal of the ovaries. After forty, the functions of the ovaries have mostly ended; and removal rather than resection should be the rule. Persons to whom constant wages are a necessity are sometimes better served by smaller risks of conservative surgery. This small but punctilious operation has, in my ex-

perience, been an incidental one, and this chiefly in connection with surgical treatment of uterine displacements, and less with operations for pelvic neoplasms, appendicitis, tubal pregnancy and old inflammatory conditions in the adnexæ. When old pus was in evidence in one or both tubes that were usually removed, I have practically always preserved one, or a part of one ovary, sometimes with ignipuncture of follicle cysts in such cases; and in all but 12 per cent. of this entire class of border-line infectious cases; menstruation has also been preserved by retaining at least the body of the uterus—always in high suspension.

My technic has been first to carry out that more perfect form of asepsis which is regarded as essential to success in bone plastics, to use fine nonchromic catgut only with fine round needles, curved or straight, according to the accessibility of the little wound. Corpus luteum cysts are easily enucleated from a linear incision over their most prominent part. Follicle cysts are removed mostly by taking out a wedge-shaped section of the ovary which is so placed that it will either remove or cut open the maximum number of follicles. From the resulting wound or from a median incision of sufficient depth, the remnants of cysts and others still unopened are peeled out or rubbed out with a bit of gauze, after they have been incised. When needed, the edges of the wound are trimmed and it is then usually closed by two rows of continuous sutures, one deep enough to control the bleeding, and a return row to coapt the edges. Hard cirrhotic portions are similarly exsected. In a number of instances, in removing cystic neoplasms, I have preserved a disc of cyst wall in connection with the pedicle, when Graffian follicles could be seen in it, and have rolled it up and stitched it together, with menstruation continuing more or less regularly, in each case. According to Zacharias⁽⁴¹⁾ Menge has gone further and done the same thing even in cases where no follicles were visible macroscopically, and also obtained a return of regular menstruation after three to six months following the operation, in three reported cases.

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DISCUSSION

DR. FRANCIS REDER, St. Louis, Mo.—This is an exceedingly interesting subject to me. I am very glad the doctor mentioned the neurasthenic condition with reference to these cystic ovaries. If the nervous state is permitted to go on to the extent we have during neurasthenia, it is hardly worth while to do anything for the patient. Patients with such cystic ovaries are very irritable. Let us take school teachers, for instance, they can assign no other cause for the irritability except they are disturbed by a pupil turning a page or the leaf of a book unnecessarily, or these patients will drop their work because they are tired. Such conditions can be traced to a cystic condition of the ovaries. The question in my mind has been, how

long such a condition holds good, and how far can we go by operative intervention with the ovary. The ovary normally is as large as an almond without the shell, but I have quite frequently seen ovaries that were from three to four times larger. The mere breaking of the ovary will demonstrate that there is a cystic condition. The resection of the ovary sometimes brings it down so that you can see macroscopically you are in healthy ovarian tissue, and thus relieve the condition.

The etiology of such an ovarian condition has been very interesting to me. The doctor has made it clear that the decensus has to take place to interfere with the circulation, and the cystic processes, together with possibly other processes, will have their origin in the ovary.

DR. HUGO O. PANTZER, Indianapolis, Ill.—Dr. Goldspohn has brought us a good deal of important material for reflection. Where follicles cannot rupture on account of the thickened albuginea, I pare off the thickened tunica. In some cases additionally I bisect the ovary longitudinally and reseed it, trusting that the ensuing scar will be more yielding to the intraovarian pressure incident to follicular development than will be the sclerosed tunica albuginea.

The subsequent course of these cases at times is highly gratifying. Immediately these patients regain nervous equilibrium, and menstruation is improved so as to distinctly indicate a relation between the operation and the subsequent course.

Let me mention a case that I have referred to before on occasions like this. A young woman married eight or ten years, was anxious to have offspring. But her suffering at the monthly period was such through many years that she asked to have relief at any expense. When the abdomen was opened, very small, hard ovaries were found. I bisected one and condemned it to removal as being hopeless of ever functioning normally. There was practically only scar tissue, no macroscopic evidence of an ovum bearing zone. Acutely conscious of the strong desire of the patient to have offspring, I was tempted to save the other though like unpromising ovary. I cut off each side a big ledge of the thickened tissue, leaving only a small pyramidal jut of ovary. Three months later I was informed that the patient had flowed freely every four weeks without pain. Six months after this the patient reported a relapse. Two periods had passed with some pain and sparse flow, and since she had gone several months without any flow, the patient was greatly distressed and expressed the fear that another operation would be necessary. My examination revealed a pregnant uterus of several months. The patient went to full term, and the letter she wrote me when her delivery of a fine child had been effected was the most grateful expression I ever received. Since then I have practised paring the sclerosed ovary in women of the child-bearing period, with a fair success, warranting the continuance of this procedure in appropriate cases.

DR. FRANK D. GRAY, Jersey City, N. J.—I desire to cite the clinical course of one case as evidence of the fact that these cystic ovaries

have a symptomatology, and also the fact of how little ovarian tissue, left behind will suffice to maintain function.

A married woman, aged twenty-two, came under my observation three years ago, having had a severe attack of pain in the lower right quadrant of the abdomen. I made an error in diagnosing the case as one of appendicitis. I found she also had a quite movable kidney. I opened her abdomen and found a normal appendix. However, I removed it and did a nephropexy. I had an opportunity to see the right ovary which, to all appearances, was normal. I did not see the left. Vaginal examination did not reveal anything wrong with the other ovary. Following that this young woman had a series of the most extreme crises I have ever observed. She would, at intervals of one to three months, have the most terrific pelvic pains she would go into collapse and seem as if she was about to expire. I finally made a vaginal examination and found evidences of a large left ovary. I opened the abdomen again, and found an ovary that resembled nothing so much as a bunch of white grapes, and there was no ovarian tissue left. I removed it. The other ovary in the meantime (this was a year after the first operation and, the ovary which I had then seen and handled and was apparently normal) was in the same condition, but I was able to find a tiny piece of apparently good ovarian tissue that was not larger than a pea near the hilum of the ovary. I resected the ovary and left the good fragment. She has been absolutely free from her crises; she has menstruated (rather profusely) since the operation, and I think the case is interesting as showing that these ovaries do have a decided symptomatology, and that a very tiny bit of ovary left will continue to functionate.

DR. GOLDSPOHN (closing).—In my own work, resection of ovaries has been in all cases associated with other surgical acts, and mostly to correct the position of the uterus. I would not resect an ovary unless I took good care of it, got it up out of the pelvis; and the higher up you get it out of the pelvis the more comfortable it is. I have about 1000 cases to endorse that statement. We must correct the position of the uterus usually, when septic ovaries are present, and we elevate the ovaries in the same act. I would rather correct the position and not resect than to do the reverse. But I have the feeling that has grown on me from an experience with a large number of cases, that these women are more comfortable if we do away with the evil results of dislocation of the ovary, by removing the cystic follicles; and when the cause, *i.e.*, the descensus is overcome by securing the uterus and ovaries in good position, the follicle cysts will not reform.

It might be thought that I have been whittling on a lot of easy cases to get my statistics. To overcome that objection, I will give you a little insight of the remainder of the material. For the years 1907, 1908, 1909, 1910, 1911 and 1912, I looked over my records, and excluded, in the first place, those cases that were out and out pus cases, cases in which any man would remove the uterus and appendages. Then I excluded tubal pregnancies, and excluded all the cases of neoplasms of any kind. That would leave the class of chronic infective cases where the infection had died out; and of that

number there were 298. In that number I did hysterectomy in 12 per cent. I believe the custom with most gentlemen would be a higher percentage than that where they are in the habit of taking out the uterus more frequently. But I treated the worst metritic uteri with galvanism afterward. When the uterus is suspended with the fundus near the abdominal wall, and the cervix is amputated as should be done, that uterus can literally be seized between the poles of the battery. If you want to do the best you can for the patient, you curet, amputate the cervix, take out the diseased tubes, and the worst ovary, leaving one ovary or part of one to keep up menstruation. I can subscribe to what Dr. Werder has said in regard to the social relation. If the patient becomes a widow and menstruates she is still a candidate for matrimony, and in her mind it makes an awful difference whether she menstruates or not. Suppose that fundus uteri is now a chronic metritic affair and does not change by being hung up, you can put the galvanic current through it making the uterus the connecting link between the two poles. You can put a hundred milliamperes through there. Do that ten or twelve times for half an hour, a week apart, and the chronic metritis will behave itself and the patient will menstruate and be well also. I do that in order not to have to do a hysterectomy, and not to regret leaving the uterus. There were in that entire number only three patients (1 per cent.) who retained the uterus without ovaries, *i.e.*, without menstruation; and the total mortality in that number was 1.7 per cent.

REPAIR AND RECONSTRUCTION OF THE BILE DUCTS.*

BY

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THE problem of repairing, anastomosing, and reconstructing the large bile ducts may confront the surgeon in dealing with accidental injuries to the ducts from traumatism, during surgical operations on the gall-bladder and bile passages, from sloughing of the ducts from severe inflammation and infection in cases of stone in the common duct, from secondary cicatricial contraction causing stenosis of the common or hepatic ducts, in operations for resection of the ducts for carcinoma situated in any part of the common duct or head of the pancreas, and in congenital malformations, such as cystic disease of the common duct.

The operations necessary for the reconstruction or repair of the bile ducts may be as follows:

1. Simple suture of a wound in the duct.

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2. End-to-end anastomosis of the ducts.
3. Plastic closure of a defect in the duct by omentum, part of the gall-bladder wall or stomach.
4. Hepaticoduodenostomy, or hepaticogastrostomy, the implantation of the hepatic duct into the duodenum or stomach.
5. Cholecystenterostomy when the gall-bladder is still present.
6. The formation of a new bile duct by transplanting pieces of veins, hardened arteries, or vermiform appendix.
7. The reconstruction of an entirely new duct, a so-called hepaticoduodenostomy with a rubber drain tube, after the method of Jenckel, Wilms, Sullivan and Verhoogen.

That the large bile ducts have remarkable powers of regeneration has been emphasized by Korte,(2) Kehr,(26) Nordman,(5) and others. Epithelialization of a biliary fistula following cholecystostomy, or choledocotomy is well known, and it is this peculiar and apparently special regenerative ability of the bile ducts which is utilized in the reconstruction of an old duct or for the formation of an entirely new one.

Owing to the increase in the number of cholecystectomy operations now being performed for cholelithiasis a consideration of the accidental injuries to the deeper ducts which have occurred during such operations is of the greatest importance. Abdominal traumatism, especially those about the upper abdomen have been known to cause rupture of the common or hepatic ducts. Uncomplicated rupture of the ducts is of the rarest occurrence, the injury being practically always associated with an injury to the gall-bladder or liver. Such injuries of the ducts are usually treated by simple drainage on account of the weakened condition of the patient at the time of operation. According to Thole(4), a primary suture of the common duct from abdominal traumatism has not as yet been reported. Spontaneous rupture of the ductus choledocus has been observed by Quinu and Rotier(4).

Both the common and hepatic ducts have been severed or partially resected during the removal of the gall-bladder. Such accidents have been reported by Korte(2), Kehr(26, 3, 7, 23, 26), Mayo (1), Doyen(11), Moynihan(22), Wilms(15, 16), and others.

Kehr(26) (p. 183) in his most recent work states that he has injured the common and hepatic ducts fifteen times in 1000 cholecystectomies, or in 1.5 per cent. of such operations. He repairs the injury by an end-to-end suture of three-fourths of the circumference of the ducts and drains the hepatic duct with a T-rubber drainage tube. All cases, with one exception, recovered. In the fatal case

death was due to biliary cirrhosis and not to the injury to the duct.

According to Kehr(26) similar cases of accidental injury to the ducts have been reported by Korte, two cases, Delagemiere, Dahl, and Dobrucki, each one case.

The author's attention was called to the importance of this accident on account of the following case.

Mrs. J. B., aged fifty-nine. Admitted to St. Vincent's Hospital, Toledo, Ohio, December 23, 1913. Married. Occupation, housewife. Referred by Dr. C. F. Douglass, Kalida, Ohio.

Family History.—Patient has given birth to four children. One child died of tuberculosis at twenty years. Two died in infancy, and one son is living and well at twenty-five years. Patient had typhoid fever thirty years ago, was sick in bed three weeks. One year later had another similar illness, but not so severe. Hay fever every year for past twenty-eight years, consists of cold in fall and lasts until frost. Menopause was established six years ago.

Present Illness.—Began about twenty years ago with attacks of pain in upper abdomen. Bowels always very constipated for several days during attacks. Always complained of gas on stomach. Attacks gradually become more severe. Never jaundiced until April, 1913, during severe attack, jaundice lasting one week, was confined to bed two weeks, did not vomit, did not require a hypodermic. Last attack started October 25, 1913, pain very severe, jaundice severe, in bed four weeks. Bowels very constipated. Examination of patient Nov. 20, 1913, elicited mass, size of goose egg, over the gall-bladder region, severe jaundice and clay-colored stools.

Patient's general condition and nutrition was fair. Former weight, 120. Present weight, 100. Pulse, 96. Temperature, 99° F. Respiration, 20. Heart, systolic murmurs at apex. Lungs, negative. Abdomen, tender over upper right abdomen. Rectus slightly rigid. Vaginal examination, negative. Urine negative, except increased amount of bile.

Diagnosis.—Cholelithiasis, Cholecystitis. Common duct stone.

Operation.—December 27, 1914; St. Vincent's Hospital, Toledo, Ohio. A right rectus incision was made, the patient being in the elevated gall-bladder position. After the removal of a chronically inflamed appendix through the gall-bladder incision, the gall-bladder was found to present all signs of a severe cholecystitis. The gall-bladder was contracted and hard, containing four stones, and one stone was also palpated in the common duct. The gall-bladder was dissected free from its attachment to the liver, beginning at the fundus and detaching it toward the cystic duct. A curved hemostatic clamp was then applied to the cystic duct and the gall-bladder amputated, the cystic artery was ligated and the common duct opened at its junction with the cystic duct and the stone was then removed from the common duct. At this point in the operation, it was noticed that what was considered to be the cystic duct, was really

the severed end of the common duct. Examination of the gall-bladder specimen which had been removed showed about 1 inch of the hepatic duct, intimately attached to it indicating a parallel course of the cystic and hepatic ducts. The severed end of the hepatic duct was found as it emerged from the liver. An end-to-end anastomosis between the common and hepatic duct was made after the technic devised by Carrel for blood-vessel suture. Three interrupted tension sutures of 00 chromic catgut were applied and the circular running stitch of 00 chromic catgut completed the anastomosis. There was some difficulty in closing a very small portion of the anterior part of the duct. A small rubber drainage tube was carried down to the site of the anastomosis and a strip of iodoform gauze packed carefully around the duct. The abdomen was then closed. The patient withstood the operation very well, pulse 110 after its completion. The postoperative course was uneventful until the fifth day when there was some discharge of bile through the drainage tube. This leakage of bile was undoubtedly due to the difficulty which was encountered in closing the anterior part of the anastomosis. The discharge of bile ceased on the seventeenth day, and the patient was discharged on the twenty-fifth day after operation. Recovery has been complete, patient remaining well up to the present time, ten months after the operation.

The accident in this case was unquestionably due to two factors, *first*, the parallel course of the cystic and hepatic ducts, and, secondly, to the severe inflammatory changes about the gall-bladder and bile ducts. The prevalent conception of the anatomy of the cystic and hepatic ducts or rather regarding the junction of the cystic with the common duct is, that it takes place at right angles; this, however, is not the case in all instances as was shown by Ruge(34) before the German Surgical Congress in 1908. In his examination of forty-three specimens he found that the cystic duct entered the common duct at right angles fourteen times (32 per cent.); he found a parallel course of the cystic and hepatic duct in nine instances (20 per cent.), while a spiral course in which the cystic duct wound itself around the common duct was found sixteen times (37 per cent.). In reviewing the literature it was found that the injury to the deeper bile ducts was due to the atypical manner in which the cystic duct was joined with the common duct. Severe inflammatory changes were in most instances also present. In all I have been able to collect thirty-four cases as follows:

Tabulation of cases of injury to the hepatic or common ducts.

Kehr.....	18	Dahl.....	1
Wm. Mayo.....	1	Dobrucki.....	1
Noordman.....	1	Garre.....	1
Lanphear.....	1	Jacobson.....	1
I. S. Stone.....	1	Wilms.....	1
Doyen.....	1	Jenckel.....	1
Moynihan.....	1	Cholin.....	1
Körte.....	1	Wolf.....	1
Delagemiere.....	1		
		Total.....	34

Immediate results in thirty-three cases, thirty-one recoveries and two deaths.

Operative technic employed.

End-to-end anastomosis with circular suture with drainage of hepatic duct.....	21
End-to-end anastomosis with circular suture without drainage of hepatic duct.....	2
New duct formed from loop of small intestine.....	3
New duct formed by rubber tube.....	2
Hepaticocholangioduodenostomy.....	1
Cholecystcholedocostomy.....	1
Plastic closure.....	3
Not stated.....	1
	<hr/> 34

Although only thirty-four cases can be found in the literature with only two deaths following such a formidable injury, it is fair to assume that only the favorable cases have been reported and that they occur much more frequently than appears to be the case. This is also emphasized by the fact that in the hands of such an experienced surgeon as Prof. Hans Kehr of Berlin, the accident has occurred eighteen times.

Körte(2) reported a case of accidental division of the common bile duct during an operation for cholecystectomy. In this case the cystic duct was short and in clamping the lower end of the gall-bladder previous to its amputation both hepatic and common ducts were cut across. The divided ends of the duct were anastomosed by a circular catgut suture. Körte was the first to emphasize the importance of careful amputation of the gall-bladder to avoid injury of the bile ducts.

Wm. Mayo(1) states that in 1100 operations performed on the gall-bladder and bile passages at the Mayo clinic up to March, 1905, seven have involved complete loss of continuity of the common bile duct as a direct result of the operation. Five of these were

TABULATION OF CASES OF INJURY TO THE COMMON AND HEPATIC DUCTS.

No.	Operator	Primary or secondary operation	Operative procedure. Pathology. Cause of accident	Operative technic	Result
1	Wm. Mayo (2)	Primary...	Accidental during operation of cholecystectomy.	Suture of posterior and lateral ends of the ducts, with drainage as in choledochotomy.	Recovery.
2	Körte(2)	Primary...	Accidental clamping of common duct during cholecystectomy.	Circular suture of duct with rubber tube drainage of the hepatic duct.	Recovery.
3	Kehr and Volkmar (3)	Secondary.	Accidental clamping of ducts during cholecystectomy.	End-to-end suture of ducts. Circular suture.	Recovery.
4	Dahl(4)	Secondary.	Complete gall-bladder fistula following cholecystectomy.	New duct formed from loop of bowel and entero-entrostomosis.	Recovery.
5	Noordman(5)..	Primary and secondary.	Division of hepatic duct during cholecystectomy.	Primary operation, an end-to-end suture of the duct. Later on account of stenosis. Transjejunal hepatic drainage "par distance."	Recovery.
6	Emory Lanphear (9)	Secondary.	Severe inflammation of common duct and injury from dislodging a stone.	New bile duct formed from a loop of jejunum.	Recovery.
7	I. S. Stone (10)	Primary...	Accidental clamping of common duct during cholecystectomy.	Partial suture of severed ends with drainage of the duct.	Recovery.
8	Doyen(11)	Primary...	Accidental division of the common duct during removal of a stone.	End-to-end anastomosis over rubber tube.	Death in ten days from cholemia.
9	Garre(17)	Secondary.	Tearing of hepatic duct.	Hepaticocholangio-duodenostomy. Anastomosis of left lobe of the liver with duodenum.	Recovery.
10	Kehr(23)	Secondary.	Accidental clamping of ducts during cholecystectomy.	Circular suture, end-to-end suture of ducts.	Recovery.
11	Moynihan (22)	Primary...	Accidental during cholecystectomy.	End-to-end suture over catheter.	Recovery.
12	Jenckel(25)	Secondary.	Complete biliary fistula following cholecystectomy.	New duct formed with a rubber tube. Hepaticoduodenostomy.	Recovery.
13	Jacobson	Primary...	Accidental clamping of duct during cholecystectomy.	End-to-end suture of ducts. Circular suture.	Recovery.
14	Delagmiere. Quoted by Kehr (26)	Primary...	Accidental injury of ducts during cholecystectomy.	Details not given....	.....
15	Wilms(25)	Secondary.	Accidental clamping of duct during cholecystectomy. Common duct ligated and accidentally resected.	New duct formed with rubber drain tube. Hepaticoduodenostomy.	Recovery.

TABULATION OF CASES OF INJURY TO THE COMMON AND HEPATIC DUCTS.—*Continued.*

No.	Operator	Primary or secondary operation.	Operative procedure. Pathology. Cause of accident	Operative technic	Result
16	Dobrucki(26)..	Primary....	Accidental clamping during cholecystectomy. Resection of hepatic duct.	Partial suture of the the duct with hepatic drainage.	Recovery.
17	Kehr(26).....	Primary....	Accidental clamping of hepatic duct.	Circular suture with hepaticus drainage.	Recovery.
18	Kehr(26).....	Primary....	Accidental clamping of hepatic duct.	Circular suture with hepaticus drainage.	Recovery.
19	Kehr(26).....	Primary....	Accidental clamping of hepatic duct.	Circular suture with hepaticus drainage.	Recovery.
20	Kehr(26).....	Primary....	Accidental clamping of hepatic duct.	Circular suture with hepaticus drainage.	Recovery.
21	Kehr(26).....	Primary....	Accidental clamping of hepatic duct.	Circular suture with hepaticus drainage.	Recovery.
29	Kehr(26).....	Primary....	Accidental clamping of duct during cholecystectomy.	Circular suture with hepaticus drainage.	Recovery.
30	Kehr(26).....	Primary....	Large incision in common duct for removal of stone.	Defect in common duct was closed by plastic operation using the part of the cystic duct for the closure.	Recovery.
31	Kehr(26).....	Primary....	Chronic obstruction of common duct by stone. Injury to duct.	Plastic closure of severed duct by utilizing part of gall-bladder wall.	Recovery.
32	Kehr(26).....	Primary....	Supposed cancer of gall-bladder. Cholecystectomy oval tear in common duct.	Plastic closure of defect in duct by a serous flap from stomach.	Died seven days after from pneumonia.
33	Cholin(29)....	Secondary.	Complete division of common duct.	New duct formed from loop of bowel.	Recovery.
34	Wolff(35).....	Primary....	Accidental division of the common duct.	Gall-bladder anastomosed to distal end of common duct.	Recovery.

Eight additional cases, details of which are not given by Kehr in which the hepatic duct was injured during cholecystectomy, on account of parallel course of the cystic and hepatic ducts. All recovered with circular suture.

intentionally produced in an attempt to remove a malignant neoplasm, one was accidentally caused and one followed an extensive operation for gall-stone disease. In the case of accidental injury of the common duct it was repaired by end-to-end suture of three-fourths of its circumference, leaving a gap anteriorly for drainage, as Mayo states he reproduced as nearly as possible the conditions of the duct which exist after incising it for the removal of stone.

Moynihan(11) reports a case of Doyen in which a portion of the common duct was removed with subsequent complete suture. In this case in extracting a stone from the common duct, the duct was

torn through, the frayed ends of the duct were trimmed and the ends sutured over a rubber tube. Recovery followed.

Moynihan(22) also during an operation for cholecystectomy accidentally removed a portion of the hepatic duct. The defect was closed by an end-to-end suture over a catheter; with recovery.

Garre(17) reports a case of tearing of the hepatic duct which was repaired one and one-half years after the injury by an hepatocholeangioduodenostomy. The patient well three and one-half years after. Garre chooses the left lobe of the liver for the anastomosis.

I. S. Stone(10) reports a case of complete division of the common duct following cholecystectomy. The gall-bladder was removed after clamping the ducts, the posterior margins of the ducts were firmly sutured together with catgut and a few stay sutures placed about the severed ends of both ducts to hold them nearly in apposition without closing their lumen. Drainage was provided for, bile discharging for about ten days, patient making a complete recovery.

Noordman(5) in a very careful review of the literature upon this subject reports a case of accidental injury of the hepatic duct in which he made an end-to-end suture of three-fourths of the circumference of the hepatic and common ducts together with drainage so that two months later a secondary operation was necessary on account of a complete loss of bile through the fistula. Noordman made a transjejunal drainage of the hepatic duct by isolating the loop of the jejunum with a lateral anastomosis of the two limbs of the loop and inserting a rubber drainage tube in the hepatic duct and running it into the isolated loop of the jejunum. The rubber tube was then brought out of the abdomen through another opening in the jejunum. In this manner a new bile duct was formed and recovery of the patient followed.

From a review of the foregoing it seems that an end-to-end suture of the common duct is followed by good results. That a complete closure of the ducts at the site of anastomosis is not only unnecessary but undesirable. Complete closure at the site of anastomosis may be followed by secondary stenosis of the duct. The better method is to make a three-fourths circular suture, leaving a sufficient opening for the insertion of a rubber drainage tube in the hepatic duct.

Noordman's case is unique inasmuch as the technic which he employed anastomosed the gall-bladder fistula itself with the jejunum. The case also illustrates the epithelization of biliary fistulæ and what can be accomplished in forming a new bile duct in debilitated patients.

The operation of hepaticoduodenostomy can also be utilized for

the reconstruction of the duct in cases of injury or after resection for tumors of the ducts. In this country Coffey(12) and Mayo(1) have each described the technic of this operation. Coffey's technic consists in cutting off the end of the duct obliquely and splitting it and then making an implantation into the bowel as in a Witzel fistula. Mayo(1) also emphasizes the importance of selecting the peritoneal-covered portion of the duodenum when the hepatic or common duct are to be implanted into the intestine.

Terrier(21) reports a case in which he made an implantation of the hepatic duct into the duodenum for cicatricial stenosis of the common duct. He also made the same operation in a case of pancreas tumor.

Wolff(35) reports a case in which for severe cholithiasis a cholecystostomy and choledocotomy with drainage of the hepatic duct was performed. In the following weeks after the operation, on account of the enormous quantity of bile which had escaped and the absence of bile in the stools, it was determined that the common duct had been accidentally divided. At the second operation, the lower end of the common bile duct was exposed and an anastomosis made between it and the gall-bladder; in other words, a cystocholedochotomy was made and the operation was followed by complete recovery of the patient.

Although transplantation of veins and even the appendix have been recommended as substitutes for the common duct, there are no cases on record.

Danis(28) made some interesting experiments on the transplantations of pieces of veins to replace defects in the gall-bladder wall. He made these experiments in two dogs. Three months after the implantation, the transplants were found to be healed *in situ* without adhesions or visible scars. Macroscopically it could not be differentiated from the normal gall-bladder wall. Microscopic examination showed the transplants to be lined with normal mucosa and covered with serosa. The author came to the conclusion that the tissue of veins is peculiarly adapted to cover defects in the wall in the biliary passages.

Molineus(33) speaks of the possibility of replacing the defect in the common duct by the appendix. As the appendix has been used as a substitute for the urethra, Molineus thinks that this principle may also be applied for defects in the common duct. The author describes his technic which he has carried out on the cadaver.

The formation of the new bile duct with a loop of small bowel after the method of a Y-gastroenterostomy has been reported. According to Thole,(4) Kausch performed an operation in which he made first

an enteroanastomosis, about 50 cm. below the ligament of Trietz, the loop of the bowel thus formed was divided and the proximal ends closed. The gall-bladder was anastomosed directly with the distal end. In this manner a new canal was formed between the gall-bladder and the intestine. In other words, a new common duct was formed. Montprofit performed virtually the same operation and reported it before the French Surgical Congress in 1908. Montprofit also reported that Dahl performed the same operation five months previously. Patient was suffering from a complete gall-bladder fistula, from accidental complete division of the common duct during an operation for cholecystectomy. Cholin also operated in this manner in 1909 for complete division of the common duct.

Emory Lanphear(9) reports two operations for total destruction of the gall ducts. One fatal and one successful. In the fatal case, the destruction was due to severe inflammation and infection of the gall-bladder and ducts. An opening was made on the upper aspect of the duodenum "to permit the bile to find its way into the gut after granulations should close the external wound." Bile, however, did not flow into the duodenum. Patient died on the fourteenth day of starvation, from leakage through the duodenum. In the second case a primary operation had been performed for stones in the gall-bladder and common duct. The stone in the common duct was pushed back into the cystic duct, as the author states "By perhaps too much pressure." The stones in the gall-bladder were removed. Three months later, on account of severe sepsis and jaundice, a secondary operation was performed. An enormous abscess under the liver and sloughing of the gall-bladder were found. Nothing resembling the common duct could be seen. A third operation was performed two months later, on account of complete biliary fistula. The upper end of the hepatic duct was found, the jejunum was pulled into the incision and cut squarely across, the lower end being pulled out to the abdomen and the end to side anastomosis of the upper end was made about 12 inches from the cut jejunum. The free end of the jejunum was pulled through a hole in the transverse mesocolon and anastomosed directly by chromic catgut suture with the open hepatic duct.

The formation of an entirely new functioning common duct after the original duct has been destroyed, seems to have been actually accomplished by Sullivan and others. The method consists in making a communication between the remnant of the hepatic duct and the intestine with a rubber tube. The rubber drain tube lies free in the abdominal cavity or may be covered over by pieces of

omentum. In this manner, the power of regeneration which the bile passages have by means of epithelialization is taken advantage of to form the new duct.

An interesting operation of this kind is described by Jenckel(25) who relates that in a patient on whom he had performed a cholecystectomy it was necessary eight and one-half months after the operation to operate again for a total complete biliary fistula; at the second operation the common duct and the lower part of the hepatic duct *was* obliterated. After opening up the biliary fistula and the lumen of the hepatic duct there was found a space of 8 cm. between the hepatic duct and the duodenum. Jenckel could only make a communication by placing a rubber tube into the hepatic duct and connecting it with the duodenum after the method of Witzel. The tube was allowed to remain for three weeks when it was removed and another one placed for eleven days longer. By this time through the epithelial proliferation of the intestinal mucous membrane as well as that from the hepatic duct, a new canal about the size of the index-finger was formed. His patient was alive and well four years after the operation.

A similar operation is recommended by Sullivan of Madison, Wisconsin (18), and performed by Brewer of New York(13) on a patient who had lost most of his common duct through suppuration and gangrene following a cholecystectomy for a fulminating gangrenous cholecystitis. Brewer attempted to make a new common duct after the method of Sullivan by placing one end of a rubber tube in the hepatic duct and the other end in the duodenum and wrapping the intervening exposed portion with omentum. The immediate result was most satisfactory, bile being abundantly discharged into the intestine. Death occurred eventually from obliteration of the newly formed duct.

Wilms(15, 16) describes a method for the artificial formation of a common duct from a simple tube. The method consists in sewing one end of a tube into the hepatic duct and the other end into the duodenum after the method of Witzel. The middle portion of the tube lies free in the peritoneal cavity and is covered over with either the omentum or colon. The tube is allowed to remain and Wilms claims that it heals *in situ*. He was able to demonstrate this in two cases which had been operated eight months and four months respectively. He describes his animal experiments on the formation of such canals which proved that the new canal functionates for many months. The method should only be used in those cases where it is

necessary for a rapid ending of the operation and where all other forms of anastomosis cannot be made.

Brand(25) reports six such operations performed by Wilms, three times the drain was carried into the duodenum, one into the upper part of the jejunal loop, and one into the stomach. Twice the drainage tube was vomited after remaining *in situ* two and four months and on one patient he was able to demonstrate function after one year. The two parts to be anastomosed should be brought together as closely as possible to favor the epithelialization and formation of the new canal.

Sullivan's(18) original experiments on dogs were made with a rubber tube leading from the hepatic duct into the duodenum. On the duodenal end of the drain tube a compressed sponge was placed and tied with catgut. When the catgut absorbs, the sponge enlarges and is supposed to pass down and out of the bowel. Sullivan recently described his method as follows: "One end of a rubber drain tube of about one-fourth inch in diameter is placed in the hepatic duct, the other end being passed into an opening in the duodenum or through the common duct. The tube is anchored *in situ* by several nonabsorbable ligatures, the tube being placed with the idea of keeping it there. The omentum is placed so as to cover over the exposed portion of the tube. In this manner a persistent sinus is formed which does not tend to contract. Microscopic sections show that "the mucosa of the duodenum grows upward and the mucosa of the duct grows downward into the new formed canal and, furthermore, that the tissues comprising the walls of the artificial canal are formed peritoneal structures and not inflammatory deposits." In a recent personal communication Sullivan informs the writer of a successful case of reformation of the bile duct, with a rubber tube. Operation was performed one year ago, with recovery of the patient.

Sullivan states that in dogs if one sections the common duct and does not ligate either end, after a little biliary leakage the duct will reunite without suture, and will do so invariably.

Verhoogen(17) on account of cancer of bile ducts, resected the cystic, hepatic and common ducts. Between the stumps of hepatic and common ducts a space of about 6 cm. existed. A rubber drain was placed in the common duct and brought to the stump of the hepatic duct, where an opening was cut into the side of the tube, the tube being brought out of the abdominal incision. Tampon. Recovery.

Propping (32) reports two cases in which a T rubber tube was used to replace and bridge over defects in the common duct. In the first

case there was an inflammatory stricture of the common duct following cholecystectomy. The stricture of the common duct was opened and the T tube placed in the ducts. This patient was examined two and one-half years later. At the third operation for another stenosis higher up in the ducts, a newly formed duct made by the T tube at the second operation was found patent and normal. In the second patient, Propping used a T tube and closed in the defect in the retroduodenal portion of the common duct. Although the patient died in twelve days from cholemic hemorrhage, the T tube was found to be functioning. Propping is of the opinion that a T tube should replace all other methods.

DeGraeuwe(6) reports a case of resection of the common duct for supposed carcinoma. The gall-bladder, cystic, and part of the hepatic and common ducts were removed. A distance of 6 cm. was found between the ends of the hepatic and common duct. An end-to-end suture was made. A new duct was formed by placing a rubber drain into the end of the common duct and running it upward to the stump of the hepatic duct where an opening in the side of the rubber was made. The end of the tube was then brought out through the abdominal incision. In this manner a new duct was formed and the patient was alive and well eleven months after the operation.

Voelcker(14) takes up the question of drainage of the bile ducts after plastic operations have been performed upon them. Drainage is easily secured by a rubber tube from the hepatic duct into the bowel. The final disposition of the tube is uncertain. Voelcker recommends that the end of the tube be brought out through the wall of the duodenum through the abdominal wall. In this manner the drain can be removed in ten days, the duodenal fistula heals spontaneously. Voelcker reports two cases in which he used this method with success. He calls this method a transduodenal drainage of the hepatic duct.

Mann, of Minneapolis, (24) reports the use of a rubber tube to assist in the replacement of common bile duct which had been destroyed as the result of cicatricial contraction and obliteration of the common duct following severe infection and sloughing in gall-stones. Cholecystectomy was performed. On account of persistent jaundice, a later operation was performed and the obliterated common duct found. The stump of the hepatic duct was opened and a rubber drainage tube three-sixteenths of an inch was used to bridge a distance of $1 \frac{3}{4}$ inches from the hepatic duct to the duodenum. This patient was alive and well five months after the operations. This case is unique as the rubber drainage tube was allowed to

remain in place with the expectation that it would pass out through the intestinal canal.

In a recent communication from Doctor Mann the patient is reported as being fairly well when last seen (June 1, 1914). Patient has had a few attacks of discomfort with general malaise of moderate degree, and occasionally a slight yellowing of the skin. The rubber tube was never found. Doctor Mann is of the opinion that her attacks of discomfort are due to a mild infection ascending into the bile ducts from below.

Arnsperger and Kimura(19) from Wilm's clinic in Heidelberg, report their experiments upon animals for the artificial formation of the common duct with a simple drain tube. Their experiments were conducted upon dogs and cats, the tube passed through the intestinal track on an average of thirty-five days after the experiment. The danger of the method consists in leakage between the tube and the ducts, resulting in peritonitis, there is also a danger of cicatricial contraction of the duodenal opening. The authors are of the opinion that the method is safer in human beings.

Cahen(29) made an anastomosis between the hepatic ducts and the stomach following a previous operation in which a cholecystectomy and common duct drainage had been performed. At the second operation, complete cicatricial stenosis of the common duct was found. With a No. 17 Nélaton catheter, Cahen made a communication between the hepatic duct and the stomach. The catheter was brought into the stomach after the method of Witzel. After four weeks the patient vomited the catheter. Healing eventually took place, the patient died three months after the operation. The autopsy showed an abscess of the liver, the new opening in the stomach had closed. The author came to the conclusion that such anastomoses between the bile ducts and the stomach functionate only as long as the drain remains. Cahen recommends the transhepatic drainage of the hepatic ducts to replace the transduodenal route. He thinks in this manner complete suture of the duct can always be accomplished.

Kramarenko(31) speaks of a method which he designates "cholecystenterostomy par distance." The method is that similar to that described by Wilms of forming a fistula between the gall-bladder and the duodenum with a drainage tube, an omental graft covers the tube. In this manner a new fistula is formed between the gall-bladder and the duodenum. The operation is indicated in certain cases of chronic stenosis of the common duct in which a simple cholecystostomy or an anastomosis between the gall-bladder and

stomach or gall-bladder and intestine is indicated. He reports a case in which he made a cholecystostomy for common duct obstruction due to carcinoma of the head of the pancreas. After two months, on account of the cachexia, a jejunostomy was made, three days later a communication between the gall-bladder fistula and the jejunostomy opening was made, a glass tube was used for the communication. The bile flowed freely into the intestine and normal stools appeared the next day. Six and one-half months after the operation the patient was well and the new communication functioned perfectly. The author thinks that this method should be the method of choice in all cases of carcinoma of the head of the pancreas for the reason that the danger of infection is very small and in case that it occurs and the new communication can be easily divided if the tumor increase in size, the jejunal opening then being used for feeding.

Jackson(36) reports an operation for formation of the new bile duct by a rubber drain tube. In this case Jackson had previously made a partial gastrectomy for cancer in which a choledochotomy was also made on account of the danger of occlusion of the common duct by cicatrization about the pancreas. To cure the biliary fistula which followed a new duct was made by anastomosing the distal end of the hepatic duct to the jejunum, a so-called anterior choledo-jejunosomy. Patient was alive and well seven months after the operation. The rubber tube was not recovered. Jackson also speaks of another similar operation for the formation of a new bile duct which he performed after removing the gall-bladder and ducts for carcinoma. This case terminated fatally.

The literature contains cases of new common ducts formed by the use of a rubber drain tube as follows:

Jenckel	1		Voelcker.....	2	
Brewer	1	Died	Mann.....	1	
Wilms	6		Jackson.....	2	1 death
Dreesman	1	Died	Cahen.....	1	
Verhoogen	1		Sullivan.....	1	
Propping	2	1 death	Kramarenko..	1	
DeGraauwe	1				4 deaths

				22 cases	

CONCLUSIONS.

1. The possibility of accidental injury to the common and hepatic ducts must not be forgotten in every operation for the removal of the gall-bladder.

2. Such accidents arise owing to the atypical junction of the cystic with the hepatic and common ducts.

3. The larger bile ducts can be repaired either by simple suture or by end-to-end anastomosis. The anastomosis should allow for drainage for the hepatic ducts.

4. Portions of omentum, pieces of the gall-bladder and flaps from the stomach have been successfully employed to cover defects in the walls of the ducts.

5. When a sufficient portion of the hepatic duct remains it may be anastomosed into the stomach, duodenum, or small intestine after the method of Witzel.

6. A new common bile duct may be formed by transplanting a piece of small intestine for the purpose, and where possible this should be the method of choice.

7. Owing to the wonderful regenerative power of the bile ducts, a complete new duct can be formed by the aid of a rubber tube connecting the remains of the hepatic duct with the stomach, duodenum, or jejunum.

8. While the immediate results of this method are good, the ultimate results are not known, therefore the method should be used only in debilitated patients.

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REPORT OF CASE OF PYLORIC STENOSIS IN AN INFANT, OPERATED ON BY THE METHOD OF DR. JOHN W.

KEEFE, PROVIDENCE, R. I.*

BY

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At the Toledo meeting of this Association, held in 1912, Dr. John W. Keefe, of Providence, R. I., read a most excellent paper on "Stenosis of the Pylorus in Infancy" in which he described an operation, for its relief, original with him. I was impressed with the simplicity of the procedure and determined if such a case should fall into my hands it should be the operation I would try.

In October, 1913, Dr. Wm. Gillespie asked me to see a case with him at Christ's Hospital. The baby was born September 25, and

* Read at the Annual Meeting of the American Association of Obstetricians and Gynecologists, Buffalo, September, 1914.

nothing unusual was noted until about the tenth day, when it began to vomit and they had great difficulty in getting the bowels moved. The baby was losing weight and was becoming very weak. It was brought to the hospital for better care and closer observation. Medication and alteration of diet and hours of feeding had absolutely no effect. I saw the case on October 29 and the distended stomach could easily be outlined through the emaciated abdominal wall. An olive-shaped tumor could be plainly felt in the region of the pylorus. Dr. Gillespie had already reached the conclusion that nothing short of an operation would save the child and I at once agreed with him.

The following morning, October 30, at Christ's Hospital the child was etherized and the usual incision made through the right rectus muscle. The pyloric end of the stomach was brought out through the incision and a longitudinal incision was made a little more than an inch from the pylorus. Through this opening a uterine sound was introduced into the stomach and through the constricted pylorus into the duodenum.

The peritoneum and muscular coat, but not the mucosa of the pylorus, was then incised transversely, which allowed the pylorus to yield readily. The uterine sound was then removed and graduated urethral sounds were rapidly introduced in its place one after another until a No. 16 English scale was passed. A short section of the hypertrophied pyloric muscle was then removed and the wound in the peritoneal and muscular coats closed in the opposite direction from the way in which it had been made. The sound was then removed and the incision in the anterior wall closed. Both wounds were closed with catgut and covered with linen peritoneal sutures.

The baby stood the operation well considering its exceedingly weak condition. Salt solution, which it had been taking by bowel, was continued. The following day it was allowed a little diluted warm milk. It vomited more or less for several days and continued to lose until it had lost a pound, bringing its weight down to 5 pounds. It then began to gain in strength and weight and left the hospital at the end of four weeks. Some time before leaving the hospital it resumed nursing at the breast and retained the milk. Its stay in the hospital was prolonged on account of the fear the mother had of assuming the responsibility of its care.

At the end of six months the baby weighed 11 1/2 pounds, a gain of 5 1/2 pounds in three and a half months. A letter from the father dated June 5, 1914, states that the baby is absolutely well. Another child of the same parents, now three years old, vomited a great deal from the time of its birth until it was

eight months old, but it continued to gain in weight right along and after the eighth month the vomiting ceased and did not trouble him after.

The simplicity of the operation, the fact that it can be done in a few minutes, that its technic is much easier than a gastroenterostomy in an infant, and the further fact that it leaves the organs in normal relations, should recommend it to surgeons.

I believe its general adoption will reduce the mortality rate, which is now about 50 per cent., very materially in this condition.

DISCUSSION.

DR. MILES F. PORTER, Fort Wayne, Indiana.—In this and similar operations in patients who are very much reduced, as these babies are, I think we might save life now and then if we introduced into the bowel before we closed the abdominal wall or wound, three or four ounces, or as much as you please, of some nutrient. The child needs it very badly. You can introduce it into the bowel in a moment without additional shock and by so doing can save a baby now and then which we would lose by omitting this little detail.

DR. JOHN W. KEEFE, Providence, Rhode Island.—I have been much interested in Dr. Bonifield's paper. Surgeons have been in the habit of doing gastrojejunostomy on the adult, and with good results, and consequently when a case of the type the doctor has reported comes up, we say gastrojejunostomy is the operation to do. But this pyloroplastic operation that Dr. Bonifield employed is a simpler operation and it will save more lives than the more serious one of gastrojejunostomy. Most operators have had a mortality of about 50 per cent. from gastrojejunostomy, for pyloric stenosis in infancy, while with this little operation of practical pyloroplasty the mortality is not high. Various operators who have not had very much experience with it have done this operation; some five different surgeons have done it and each of their patients has recovered, which means a good deal for the simplicity of the operation. I would urge those of you who have not done it to try it when you get the opportunity, as you will find your mortality will be decidedly less, than with gastrojejunostomy.

As to the ultimate results, one of these cases was a boy, who is eight years of age now, and within two weeks the grandfather told me how strong and well the child was and how he was able to eat and take any kind of food. The ultimate result is good.

DR. BONIFIELD (closing).—Let us suppose that this is the hypertrophied pylorus, and the stomach is dilated as I have tried to represent it (indicating). A very short incision is made in the anterior wall of the stomach to introduce a sound. I use a uterine sound passed through the pylorus into the duodenum. Then make a longitudinal cut down to the mucosa, but not through it, using the uterine sound as a guide. The uterine sound is then withdrawn.

Take a set of ordinary urethral sounds and pass one after another until the opening is dilated to number 16 English scale, which is enough. The muscle is hypertrophied and very dense. It is much like fibrous tissue when you dissect it out and comes out in fragments. You must dissect some of it out to get the wound to come together in the opposite way from that in which it was made. The caliber will be large. It is closed with a double row of stitches and with the sound in position.

ABDOMINAL DRAINAGE.*

BY

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DRAINAGE of wounds is a subject that has received careful consideration during many centuries. It may be said to be as old as the hills, for do we not find in the earliest medical writings mention of lead and brass tubes having been used to drain both the pleural and abdominal cavities?

When to drain and when not to drain, how to drain and where to drain, how long to drain, and whether to drain at all, and what is the most desirable drainage material? These are questions which are by no means settled at the present day. The subject of drainage still continues to be in a state of evolution.

We must admit that gravity is the most important aid to drainage and that next in importance is capillary attraction procured by a tube or gauze, or both. The absorptive power of the peritoneum is least in the pelvis and gradually increases upward until it is greatest at the diaphragm. It was at one time advocated that we elevate the foot of the bed to cause the flow of infective material toward the diaphragm, where it would become more rapidly absorbed and eliminated. It was then found that the patient might become overwhelmed with the amount of toxins absorbed. Later, upon Fowler's recommendation, gravity was again called into play and we raised the head of the bed and even placed the patient in a sitting posture.

Most of us remember the glass tube placed through the lower angle of the abdominal wound and into the pelvis, at the close of nearly every abdominal section, and the glass syringe with a rubber tube attached which was used at frequent intervals to remove the fluid which accumulated in the glass drainage tube. After some

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years it was found that infection of the peritoneum occurred, at times, through the use of the drainage tube and syringe. Also, ventral hernia at the site of the drainage opening was a not infrequent aftermath. Now the glass drainage tube is seldom seen in the surgeons armamentarium, as we soon learned that the peritoneum was capable of taking care of a considerable amount of toxic material.

There is a growing tendency to drain less and less. Recently some surgeons, notably Dameron, Wallace and Adams have advocated closing the abdomen without drainage, after removing a gangrenous appendix with free pus in the peritoneal cavity. These methods to me seem too extreme.

Infection of the abdominal structures, especially the fat and fascia, is likely to occur and may require drainage. Owing to the adhesions which rapidly form around the drainage tubes, their value is limited in the treatment of peritoneal infection; for since the tissues of the abdominal wall possess a much lower degree of resistance than the peritoneum, drainage of the former may frequently be called for where drainage of the peritoneal cavity is not necessary. The presence and pressure of a drainage tube in the peritoneum adjacent to covering the bowel, may determine the transudation of organisms from the lumen of the gut to the peritoneal cavity.

No one now thinks of draining the pelvis following the removal of the uterus, tubes or ovaries; unless there are unremovable bacteria; capillary hemorrhage, requiring packing with gauze, or injury to the ureter, bladder or rectum. We do not now drain where clean blood is found in the peritoneal cavity following injury or ruptured tubal pregnancy. The peritoneum has shown itself amply able to care for this extravasated blood as well as normal bile or urine which may have entered the abdominal cavity.

The ancient dictum of *ubi pus ubi evacuo*, still holds good with reference to pus in or about the abdominal viscera.

Our countryman, the celebrated Dr. Peaslee, as early as 1855, drained the pelvic cavity by making an opening through the vagina posterior to the cervix into Douglas' culdesac.

We can aid gravity by the use of a soft rubber drainage tube or a wick of gauze, but intraabdominal pressure also assists the flow of fluids into the vagina. This intraabdominal pressure, I believe, is an important factor in forcing fluids through our drainage wounds.

The materials in use at the present day are soft rubber tubing, gauze wicks, cigarette drains, made of gauze covered with soft sheet

rubber tissue, or a rubber tube cut spirally with a gauze strip drawn through its lumen. The number and the type of drains to be used, their location and the length of time they are to remain, vary with one's experience and judgment.

Should it be deemed necessary during an abdominal operation to drain the pelvis through the vagina, the drainage tube, or gauze or both, should be passed from the abdominal cavity through an opening made from Douglas' pouch into the vagina and never from the vagina into the pelvic cavity. The vagina may be readily entered by lifting the uterus, thus making the uterosacral ligaments prominent and cutting with a knife, or scissors, close to the cervix between the uterosacral ligaments into the vagina.

Boveé suggests, in cases where the uterus has been removed, leaving a cervical stump, passing one blade of a scissors through the cervical canal and cutting the cervical stump posteriorly, thus entering the vagina.

The surgeon should never rely upon an instrument passed from below by an assistant, but make the opening from above as described, where there is no danger of injuring important structures. A case is on record where an assistant while endeavoring to place an instrument in the vagina, as a guide, to assist the surgeon in making an opening in the vagina from above, had passed the instrument, by mistake, into the rectum, and the gauze was drawn from the pelvis out through the rectum with a fatal result. In another instance the instrument was passed through the urethra and bladder, and the bladder was incised instead of the vagina.

The site of the incision made to open the abdominal cavity should be determined not only by the nature of the disease or seat of the tumor, but also with a due regard for a suitable place for drainage.

Saline cathartics and the use of large quantities of water per rectum, flush the kidneys and bowels and thus remove toxic material. These are very potent adjuncts to external drainage.

Where shall we make our incision for removal of the appendix? While each case is a study in itself and no hard and fast rules should be laid down, yet we may mention our belief in the value of certain methods of procedure. Take a case of chronic appendicitis, interval operation, where we wish to examine the stomach, pylorus, duodenum, gall-bladder, as well as the uterus, tubes and ovaries, the vertical right rectus incision undoubtedly gives us the most desirable access to these parts.

The cases of acute appendicitis, however, present an entirely

different problem. Most of these cases will require drainage whether the appendix is removed or not, hence the incision should be made in a location best adapted for adequate drainage and least likely to be followed by hernia. We know that drainage through a right rectus incision is frequently followed by hernia, hence I wish to emphasize the value of the McBurney or muscle separating incision, not only because by this method adequate drainage can usually be obtained, but the abdominal wall is left in a more normal condition and hernia at the site of the drainage opening seldom occurs.

I am not in accord with those who say that the McBurney incision should not be selected when we find drainage necessary. I have time and time again proved that excellent drainage may be obtained through the McBurney incision. I firmly believe that the McBurney incision is the most desirable one in cases of acute appendicitis, whether we wish to drain or close the wound without drainage. The opening can be made sufficiently large so that we can remove the appendix, examine the uterus and both tubes and ovaries and allow us, if necessary, to remove the tubes and ovaries.

An examination of the pylorus, duodenum or gall-bladder should not be attempted in acute cases of appendicitis owing to the danger of spreading toxic material to other portions of the abdominal cavity. The low right rectus or median incision may be desirable where we feel that there is need of pelvic surgery as well as surgery of the appendix. These incisions may be closed throughout and drainage carried out by means of a drain inserted through a separate stab wound. Stab wound drainage is of distinct value and should be more often employed. We should remember, however, the fact pointed out by Coffey that a drain is efficacious only in proportion to the area of a transverse section at the point of construction.

Our cigarette drains at times not only do not drain but seriously interfere with drainage by plugging the wound and causing retention of secretions. This condition of affairs may be avoided by the use of the rubber drainage tube which keeps the edges of the wound apart and allows fluids to pass through the lumen of the tube. These tubes were more frequently employed in the past and with great benefit.

Drains are of value not only on account of their capillary action, but because they can be used to wall off and thus protect the uninjured structures from the field of infection. They are of decided assistance in checking troublesome oozing when not readily access-

ible or when difficult to stop by ligature. A drain also aids in the formation of a sinus to the site of the infected area.

Formerly many cases of appendicitis were drained by making one opening in the right iliac region near the anterior-superior spine of the ilium and another in the loin and drawing a rubber tube through from one opening to the other, and I believe that this method may be used with advantage to-day in certain cases with large abscesses. Sometimes a yard or more of gauze was used to wall off the appendicial region and even allowed to remain several days, requiring the administration of an anesthetic for its removal on several occasions.

Dr. Morris did yeoman service by ridiculing this procedure. He said these men who stuffed their patients with gauze were not surgeons, they were taxidermists. We all now realize that great injury may be done by using too much gauze. One or two cigarette drains are usually sufficient for adequate drainage following the removal of a gangrenous appendix. One drain should be placed at the site of the appendix, the other in the pelvis. They should be removed in one or two days and replaced by a rubber tissue drain.

A counteropening in the right loin is of value occasionally where large abscesses have formed and vaginal drainage is sometimes desirable where we have large collections of pus in the pelvis the result of appendicitis.

Drainage is carried out in cases of acute pancreatitis by placing drains in contact with the pancreas through openings made in the gastrocolic or gastrohepatic omentum. Certain cases may require incision into the pancreas. The region of the pancreas may also be reached through an incision in the back, in the left costoiliac space. This method of approach has been seldom used on account of the fear of injuring important blood-vessels.

A subdiaphragmatic abscess may be reached by an incision into the abdominal cavity made in the right eleventh costal interspace in the posterior axillary line. Certain cases may be best reached through a high right rectus incision. The transpleural operation, to reach a subdiaphragmatic abscess, is mentioned only to be avoided.

Drainage is the most important thing to be secured in disease of the biliary tract. How, then, is this best brought about? At one time we opened the gall-bladder and stitched the edges of the gall-bladder to the edges of the parietal peritoneum. While this method has been efficacious in some instances, it was found to be followed for some months by a pulling sensation at the site of the scar.

Many surgeons now pass a rubber drainage tube into the gall-bladder and close the opening about the tube with a purse-string

suture of chromic gut, one end of this suture is then passed through the tube and tied, this holds the tube in place until the catgut dissolves, which is usually about the tenth day. A cigarette drain passed by the side of the gall-bladder to the cystic duct takes care of any oozing or secretion which may have run down the side of the gall-bladder during the operation. This drain can be removed on the second day and replaced by a rubber tissue drain from day to day as long as drainage is required.

The common duct can be drained by placing a small rubber catheter, the end of which has been removed and an opening made in its side about 1 inch from the end, through the common and hepatic ducts and into one of the branches of the hepatic duct. The opening in the side of the catheter is placed opposite the entrance of the other branch of the hepatic duct, one or two sutures are now used to fix the catheter in the opening in the common duct.

Drainage of the gall-bladder with a drainage tube and a cigarette drain to the common duct may be all that is necessary.

Should we drain our cases of tuberculous peritonitis or is it sufficient to open the abdomen and allow the fluids which have accumulated to escape and close the abdominal wound? I have seen a number of cases relieved and some cured by this latter method.

Drainage is most effective when we call to our assistance the forces of gravity, capillary attraction and siphonage.

CONCLUSIONS.

1. Drain when necessary, but only with suitable material and not for too long a time.
2. Aid elimination and assist drainage by large enemata of water and saline cathartics. The abdominal incision should be made with a due regard for drainage.

DISCUSSION.

DR. CHARLES W. MOOTS, Toledo.—I would disagree with the part of the paper that refers to making an incision with the idea of drainage. I consider it much better to make your incision with reference to removal of the pathology, and a thought of the anatomy of the parts, and consider drainage afterward. I am glad the author refers to the stab-wound drainage. For some time, even in gall-bladder drainage, I have been using a stab-wound away from the line of incision, and we find we get along very nicely. Therefore,

I am decidedly in favor of getting drainage away from the line of incision if possible.

DR. ALBERT GOLDSPOHN, Chicago.—We must always bear in mind that the peritoneal surfaces very soon agglutinate together to shut out any foreign body, any tube, any gauze, any drain we may put in. When we introduce a tube they can do that very quickly. You may move the tube and it does not break down this new wall of agglutination that has been formed. If we introduce a gauze rope or something that will slip in easily, we will have the same thing occur. If we introduce gauze, there will be a fibrillary adhesion for the first day or two to the viscera and the serous surfaces, and it will stick until enough time has elapsed, say some four or five days, until an exudate forms, and that causes the foreign body to become loose from the tissue. Therefore, gauze is superior to any smooth surface as a drain because capillary attraction will be really active, thoroughly active, for about forty-eight hours. Soon after that the fibers become saturated with fibrin or mucin, and it may be in danger of becoming a cork. We can disturb the agglutination between the gauze fibers, and the tissues and renew drainage thereby from day to day. By beginning to move strands of the gauze after forty-eight hours, we reestablish active drainage. Intraabdominal pressure assists capillary drainage to move the liquid uphill. Therefore, I want gauze drainage; but if we leave the incision in the abdomen so wide open that gauze will not be constricted and drainage not interfered with by constriction in the abdominal wall, then we will frequently have a hernia follow. I have overcome that difficulty in my practice with satisfaction by having an oval glass tube constructed that is only long enough to go through the abdominal wall and a little further, and has a lumina of from about $\frac{3}{4}$ to $1\frac{1}{4}$ square inches, with a flange outside, so that it is practicable. I put the gauze or cigarette drain down through that tube. I do not care to have the gauze walled off by anything after it gets inside beyond the parietal peritoneum. The pain in pulling it out comes from contact with the parietal peritoneum, but the visceral peritoneum does not have much feeling, and the former we protect with the glass tube. If the drainage becomes inactive after forty-eight hours, I begin to pull enough to break up agglutination, and start up new drainage. I close the abdominal incision, all the layers of fascia and everything solid up against the tube from both ends of the wound, so that when the tube comes out the small wound collapses, and we practically never see any hernia.

DR. FRANK D. GRAY, Jersey City.—Gauze will drain water. Its fine capillarity is such that it will not drain a thicker fluid like pus; consequently the cases where we need drainage of pus are not to my mind provided for by gauze drainage. Where we need serous drainage, only, gauze is sufficient. In my opinion the most efficient abdominal drain ever devised was proposed by Peple, a surgeon of Richmond, Virginia, about three years ago. This drain is made by splitting a piece of rubber tubing longitudinally; inside of that is placed some folded rubber dam, so that you have from six to ten

thicknesses longitudinally or lengthwise, sewing this to the posterior wall of the split tube by two or three interrupted sutures to keep it in place. You have a certain amount of capillarity that an empty tube does not possess, and yet you do not have the plugging quality of gauze. I have used this drain with great satisfaction for the last three years.

The question of when to drain was not touched on. We find cases of early appendicitis where there is apparently a purulent effusion in the peritoneal cavity, but this fluid in most cases is harmless. It is serum filled with leukocytes. It is, in all probability, sterile. These cases can be left without drainage. Late cases of pus accumulation, like old pus tubes, are generally sterile and can be left without drainage. The mid-way cases are dangerous and we ought to drain them.

DR. EMERY MARVEL, Atlantic City.—With reference to the question of drainage, in cases in which it is desirable to drain, it is very essential to know how best to care for the material draining. Realizing that this discussion is being held in a meeting where diseases of women are mostly considered, I hope I am not presuming too much if I should trespass for a minute on the Association's time to present a little apparatus which has served me well in remedying a very difficult and annoying condition in connection with suprapubic cystotomy. Those of you who have done suprapubic cystotomy and prostatectomy know that there is excoriation of the skin of the scrotum and thighs where the urine comes in contact. This is especially true after the tube has been removed. In addition to that, it is disagreeable to the nursing staff who has to do with the bedding. In attempting to secure a means of overcoming this annoyance, I went to Lentz of Philadelphia and suggested a means whereby sufficient pressure upon the abdominal wall could be secured to prevent leakage, which pressure should be of such a nature that it would not be injurious to the skin of the abdominal wall. It should limit all fluid to its confines, and have a reservoir for collecting. We took the pneumatic collar of an Allison by inhaler which when inflated pressure over the suprapubic aperture can be attained. A metal cap with drainage was provided. The device is very simple and convenient and it can be strapped to the abdomen with suspender straps and can be held taut. The usual reservoir or urinal, is placed upon the leg into which the urine is collected. I want to recommend this device to you as being very useful. Where a patient is greatly distressed by urine trickling down the surface, this contrivance affords relief. In twenty-four hours the skin was dry and all irritation had disappeared in the case where I used it. It can be worn while the patient is in bed, standing or walking.

DR. J. HENRY CARSTENS, Detroit.—If my friend Dr. Goldspohn, of Chicago, had ever had a gauze drain in his abdomen, he probably would treat his cases a little differently than by establishing drainage by means of gauze, because if there is anything that hurts a patient it is to take that gauze out, and gauze absolutely stops drainage inside of twenty-four hours as we have demonstrated. It is not

that you have to wait until it is loosened, which does not take place in a few days; it may take ten days sometimes, and still be adherent. Not only do you hurt the patient by pulling out the gauze you put in the abdominal cavity, but you *liberate some of the adhesions* that have been formed in the gauze, and these adhesions open the general peritoneal cavity and some of that virulent pus and toxins may get into the abdominal cavity. Every time you pull out some gauze the patient will have a severe attack of pain until Nature walls off the opening, and the next day you pull out some more gauze and there will be some more pain. There is nothing like a plain rubber tube for drainage, and you can use the smallest kind if you wish. This brings up the question of the size of tubes to use. The nurse comes along with a tube $1\frac{1}{2}$ in diameter, and I say to her, "I am not a veterinary surgeon; I am not operating on elephants; I am an abdominal surgeon, and I want a small tube." I use a tube $\frac{3}{8}$ to 1 inch in diameter, and if necessary I put in two, but one is generally enough. I do not have it perforated because it so happens that once in a while I wish to wash out the bottom of the cavity, and if the tube goes to the bottom I can wash it out. What I would plead for is a simple, plain rubber tube for drainage purposes. You do not have to use it very often.

Reference was made to opening the vagina from above. I have had constructed a special perforator of the culdesac, and I can do that myself. I need not put my finger into the vagina; I do not like to do it when performing an abdominal operation. I can put that instrument in the vagina, I can feel with the other hand the posterior culdesac, and when it is in there I can perforate. Take hold of the rubber tube, and pull it down the vagina, and the whole thing is done.

Dr. Marvel has described and demonstrated an apparatus which he uses in cases of suprapubic cystotomy. When I do that operation I put in a little rubber tube, sew it up close so that nothing comes outside of the tube. To that tube I attach a small piece of glass tube, and then a longer tube that goes on the side, and as a result I have not a particle of leakage. I can watch the glass tube to see what is going on.

As I have said, I wish to make a plea for simplicity, in very very rare cases only is gauze of value. Let this miserable gauze business alone, as gauze causes a great deal of trouble. The atmospheric and intraabdominal pressure will force out fluids through the tube.

DR. WILLIAM SEAMAN BAINBRIDGE, New York City.—There are a few points in connection with this very interesting paper to which I desire to call attention. It brings me back to the time of Charles McBurney, when, as his house surgeon, I often heard him speak of what he called the grid-iron incision which we now call after him. He frequently explained that by extending upward and outward, or downward and forward, good drainage could be easily obtained in pus cases. Although severely condemned by many for use in septic patients, it is interesting to hear Dr. Keefe strongly advise it. I have seen it employed many times, and have employed it myself in a great many cases, with excellent results.

The rubber drainage tube is highly recommended. In connection with this I would like to bring to your notice the oft-repeated advice of Sir Berkeley Moynihan, given to us at Leeds, never to use a rubber drainage tube at all for the drainage of other than hollow organs unless the tube be split either directly or spirally. A drainage tube is likely to become plugged where there is coagulating matter to pass through it. I always split the tube.

Another point is in connection with the drainage of cases of tuberculous peritonitis. Drainage of these cases, unless they be of the mixed type, is unfortunate for the patient. I think it simply adds to the adhesion already there. I take it that we are discussing the type that might have fluid to drain, but there are cases of tuberculous peritonitis that do not need drainage. Instead of employing a drain, which means an added number of adhesions, it has been my practice for the last ten years to introduce into the abdomen, after the adhesions have been broken up, and the fluid removed, 95 to 98 per cent. pure oxygen. This is introduced and the individual is blown up to the fullest extent possible, and the wound absolutely closed. The oxygen will remain for from forty-eight hours to a week, depending upon the amount used. Oxygen has a definite effect in inhibiting the growth of organisms, helps prevent adhesions, acts as a tonic, and diminishes the likelihood of the fluid reaccumulating. I would not like to return to the old method of draining these cases.

DR. ROBERT T. MORRIS, New York City.—The question of whether capillarity or gravitation exerts a greater force is one that relates to the character of the fluid to be drained. With a thin fluid to be drained, capillarity has the greater force. With a thick viscid fluid to be drained gravitation exercises a greater force. With the question of abdominal pressure comes the whole question of atmospheric pressure. Atmospheric pressure causes abdominal pressure. When I squeeze a grape I will get the inside of the grape out. That is the question of abdominal pressure in relation to free fluid within.

As to gauze drainage, I have not a great deal to say. In the days when we packed patients with gauze and iodoform gauze at that, I spoke of committing taxidermy upon these patients. The idea of gauze drainage is fallacious unless you use a Mikulicz apron, a covering of gutta percha tissue or rubber dam. The small capillary drain surrounded by gutta percha tissue would drain well enough in most cases.

In regard to closure without drainage, Dr. John G. Clark and I in 1895, published papers and took the first stand upon the subject, and the profession fired at us with murderous 13-inch guns and everything you could imagine. Then the question was forgotten altogether for seven or eight years. Now, the profession is taking it up again. There are very many cases of septic peritonitis that can be closed without any drainage whatever, depending upon the leukocytosis which has been established by the patient for disposing of infection. In regard to tuberculosis of the peritoneum, it makes no difference whether you blow the patient up with hydrogen dioxid, or inject iodine through a trocar, or whether you open and put in a

wick drain, or whether you do not drain at all, so long as whatever you do excites a great degree of local hyperleukocytosis. That is the idea. It is the hyperleukocytosis which wipes out the tubercle bacillus. I thought it was the saprophytes at one time, and I took the fluid that entered by way of the drain, extracted the globulins, and used them against test-tube cultures of tubercle bacillus, and came to the conclusion that it was the saprophyte toxins which destroyed the tubercle bacillus and brought about a cure in these cases. But I know better now. Anything that will excite a great degree of hyperleukocytosis within the peritoneal cavity will have a tendency to wipe out the tubercle bacillus.

DR. DAVID HADDEN, Oakland, California.—In this connection I would like to speak of the work of May. His work emphasizes the importance of protecting as much as possible the omentum, and not removing the least portion of it if we can help it. He took sterile beads and placed them in the abdomen and found after varying periods of time that these beads were always free and undisturbed. The same beads, infected, were taken up by the omentum and formed a beautiful apron, no matter in what part of the cavity they were originally placed. Around the beads was deposited lymphoid material with the formation of lymphatic glands. I regard that work as exceedingly interesting in connection with this question of abdominal drainage.

DR. KEEFE (closing).—In some of our large hospitals we find cases of appendicitis that have been going on from four to twelve days. I do not think we can treat these cases as we do the interval cases. I think it is very important as to where we make the incision. The primary incision in the loin may be best. I have a case in point that came under my observation five days ago where the abscess was in that direction. If I had opened at the site of the appendix and searched for the appendix and later found a pint of pus in his loin, it strikes me it would be much wiser to have attacked the pus where it was. I made a small opening and drained, and found a fecal concretion which proved to me that the trouble was appendiceal, that the appendix was perforated and had become gangrenous. I did not see the appendix. I think it is much wiser not to search for the appendix in many of these cases. It is important to know whether you are going to drain or not and make your incision to conform to that decision. In comparatively clean cases we may drain through a stab-wound alone, but in the cases with large collections of pus, in the neglected cases, I still believe we should make our incision over the point where the disease is most prominent. We know that a cigarette drain will not drain pus, but we also know that a tremendous amount of serum is thrown off and the pus is diluted, and the cigarette drain will drain that fluid which contains pus and serum.

THE TREATMENT OF URINARY CALCULI AS BASED ON
THEIR CHEMICAL COMPOSITION.*

BY

CHARLES B. SCHILDECKER, M. D.

I. Introduction. BEFORE a pathological concretion may form it is essential that there be a nucleus of some substance different from the substance to be deposited. Upon the nucleus substances crystallize out of solution and in few cases would the concretion form, were it not that the solution contains an excess of some substance. However, the nucleus may, in certain instances, cause the precipitation of the substance. Concretions consist, therefore, of mixtures of colloids and crystalloids deposited from solutions of colloids and crystalloids, and, on this account, the application of the principles of colloidal chemistry throws considerable light on the conditions of their formation.¹ It is to be remembered that the constituents of urinary calculi are derived from the secretion of the kidney and are usually deposited on account of an over saturation of the urine or on account of a change in the composition of the urine, which renders them insoluble. Although the amount of colloidal material in the urine is small, it plays an important part in keeping in solution the less soluble crystalloids, such as urates and calcium oxalate. In inflammatory conditions, fibrinogen appears, which readily forms the irreversible fibrin, and conditions thus become favorable for the formation of concretions made up of any crystalloid that the urine may be saturated or oversaturated with at that time. Aschoff and Kleinschmidt claim that most urinary calculi begin as primary calculi formed independent of any inflammation, but from an excess of the main constituent (uric acid, oxalates, xanthine, ammonium urate); this calculus then forms the crystalline nucleus of the laminated secondary deposit of other substances (uric acid, oxalates and phosphates); all being deposited without inflammation. The inflammatory formations are usually deposited on a foreign body or a primary calculus and are composed chiefly of ammonium-magnesium phosphate and ammonium urate.

Urinary calculi may consist of the following substances, uric acid, indigo, ammonium urate, xanthine, cystine, urostealith fibrin, chole-

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terol, calcium carbonate, calcium oxalate, calcium and magnesium phosphate (the so-called bone earth) and triple phosphate (ammonium-magnesium phosphate). It was formerly taught that most urinary stones are composed of uric acid or urates, but recent studies show that this idea is wrong, and that the majority of urinary stones are composed of calcium salts. They have also shown that it is impossible to determine the nature of the stone by macroscopic examination, that the only method is to examine it chemically, and that the treatment instituted should be based on the character of the stone. It is especially important that those subject to urinary lithiasis should be treated along the lines suggested, after the nature of the stone or gravel has been determined, as it is only by this procedure, that we may be able to prevent the formation of new stones or the further growth of the primary stone.

II. Dietetic and Medicinal Treatment of the Various Varieties of Urinary Calculi.—(a) *Phosphate calculi*: The dietetic indications are to diminish the intake of calcium, thereby putting the phosphate in a more soluble form. Foods rich in calcium are therefore to be avoided, such as, milk, fish, eggs, beer, wine, liquor and fruits, while meat, potatoes, cereals, broths, sugar, sweets and puddings are allowed.

Medicinally hexamethylenetetramine and acid sodium phosphate should be given. Diuresis should be promoted by advising the use of large quantities of water. Of course in those cases where hyperacidity of the gastric juice is present, this must be treated along appropriate lines.

(b) *Uric Acid Calculi*.—It will be remembered that the uric acid of the urine has a twofold origin, the endogenous, derived from the metabolism of the tissues and the exogenous, derived from the decomposition of the food. The endogenous is constant for the same individual and is uninfluenced by diet, while the exogenous can be profoundly influenced by diet. It must also be remembered that the deposition of uric acid from the urine does not depend entirely upon the amount present, but very largely on the chemical relationships determining the formation in which the uric acid is excreted, and that in order for it to remain in solution in the urine, the reaction of the urine must not be too acid and salts must be present to unite and form the necessary bases.

The dietetic indications are for a mixed diet with a preponderance of vegetables, fats, and carbohydrates, and low protein of a purin free nature. Liver, brain, sweetbreads, kidneys and fish roe are forbidden; also game, pickled fish, shell fish, sauces, highly flavored

foods, mushrooms, broths, beef-tea, meat extracts, coffee, tea, alcoholic drinks, cocoa, chocolate and asparagus. Much salt, and all salt fish and salt meat should be avoided because uric acid is more easily precipitated from urine containing an abundance of salt.

Fats, milk, whey, milk gruels, eggs, butter, cream cheese, gelatin, peas, beans and fruits are especially good. Enough water should be given to cause about 2000 c.c. of urine a day. Following is a very good dietetic régime:

Breakfast.—8 oz. milk

1 1/2 slices bread and 1 pat of butter
2 tablespoons of cream of wheat with
2 oz. cream and 2 teaspoon of sugar
1 soft boiled egg.

Dinner.— 8 oz. milk

1 soft boiled egg
Potatoes with 1 oz. cream and 1 pat butter
Lettuce and cabbage
1 1/2 slices bread with 1 pat butter.

Supper.— 1 egg

8 oz. milk
2 1/2 tablespoons of cereal with 1 oz. cream and sugar
Crackers with butter
1 cube of cheese
1 cup of tea with 1 oz. cream and 1 tablespoon sugar.

Protein.....	80 gm.
Fat.....	112 gm.
Carbohydrate.....	207 gm.
Calories.....	2300.

Medicinally alkalies are indicated, as they diminish the acidity of the urine and make it a better solvent for uric acid. The less the acidity of the urine, the greater its content of alkaline phosphates, and, therefore, the greater the quantity of uric acid combined with alkalies, and, therefore, more easily soluble. About ʒi potassi. bi-carb., either in powder or dissolved in a pint of water, is needed per day. Celestines, Vichy, about 1 quart a day, is also of service, on account of its high calcium content. Potassium salts are better than sodium salts, on account of the relative insolubility of the sodium salts.

(c) *Oxalic Acid Calculi.*—It is to be recalled that the condition of the urine most favorable for the solubility of the oxalates, should present an increased acidity from the double acid phosphates and an increased content of magnesia with a small amount of calcium. There-

fore, we must increase the acidity of the urine, decrease the calcium and increase the magnesium.

The diet should be low in carbohydrates so as to prevent their fermentation, which increases both the formation and absorption of oxalic acid. On account of high oxalate content, the following should be avoided, rhubarb, spinach, sorrel, strawberries, figs, potatoes, beetroot, French beans, tomatoes, plums, tea, coffee and cocoa. Peas, asparagus, mushrooms, onions, lettuce, rice, cauliflower, cabbage, peaches, grapes, apples, carrots, wheat, oats, meat, eggs, butter, milk and sugar may be used. The following is a very efficient diet scheme in oxaluria and related conditions.

DIET SCHEME IN OXALURIA.

- 7:30 A. M. Glass of hot water.
- 8 A. M. Fish (haddock, halibut, cod, hake, sole, plaice, mackerel, salmon, trout, etc.).
Eggs (lightly boiled, poached, or scrambled), bacon, ham, chops, or steak, stale bread or dry toast with plenty of butter, fruit, (apples, oranges, pears, pineapple, peaches, melon).
- 11 A. M. Glass of water.
- 1 P. M. Soup (potato, onion, pea, carrot, asparagus), eggs when not taken at breakfast, chops or steak, cold meat, chicken, tongue, ham; vegetable salads with French dressing; fruit (as at breakfast), a glass of milk or water.
- 4 P. M. Glass of water.
- 7 P. M. Raw oysters, soup (as at lunch), fish (as at breakfast), beef, mutton, chicken, vegetables (potatoes, cauliflower, Brussels sprouts, French beans, peas, carrots, lettuce), fruit (as at breakfast), cheese, toast and butter, glass of water.
- 10 P. M. Glass of hot water.
- Note* Take only easily digested vegetables. Avoid too much milk, but take an abundance of water.
- Must avoid* Spinach, sorrel, rhubarb, tomatoes, beet, celery, cucumber, broad beans, haricot beans, grapes, plums, gooseberries, sugar or sweets. Pepper and all condiments and highly seasoned foods. Sweet-breads. Liqueurs and brandy. Figs and gooseberries.

Medicinally acids should be given, for example:

(1) Acidi nitrici diluti	ʒii
Tinct. cinchonæ comp.	ʒi
Syr. zingiberis	ʒi
M. et S.	ʒi t.i.d. p.c.
(2) Acidi lactici	ʒi
Tinct. aconiti	Mx
Tinct. gentianæ	ʒii

Syr. aurantii.....	℥iv
Aq. dest. qsad.....	℥ii
M. et S.....	℥i t.i.d. p.c.

(3) Acid sodium phosphate gr. xxx per day.

The magnesia of the urine may be increased by giving magnesium salts or burnt magnesia gr. xxx per day.

(d) *Cystine Calculi*.—The cystine calculi are very rare but of great interest.(4) It will be recalled that cystine is a sulphur-containing constituent portion of the protein molecule. Under normal conditions all of the cystine taken in the food is completely oxidized, but certain individuals have lost this power and in these people calculi often form. The only indication we have had for treatment is based on certain experiments showing that with a restriction of the protein intake the amount of cystine excreted is greatly lessened. Recently Klemperer and Jacobi(5) have described a case of this condition whereby the administration of six-ten grams of sodium bicarbonate per day caused the cystine to disappear from the urine.

(e) *Very Rare Calculi*.—The indigo, xanthine, urostealith, fibrin and cholesterol calculi are so extremely rare and so little is known regarding their pathogenesis, that nothing can be said regarding their treatment except in regard to the xanthine stones, as in this case the indications are the same as those for the treatment of the uric acid stones to which it is closely related chemically.

III. Conclusions.—An attempt has been made in this paper to call attention to the importance of the chemical examination of urinary stones and also the treatment of same as based upon their chemical composition. While our knowledge of all the chemical factors that play a part in the formation of urinary calculi is limited, still it is our duty to apply the knowledge we do possess at the present time. I have no doubt that the application of the principles mentioned in this paper, will prove of service in the treatment of calculi, both as regards their new formation and also as regards their further increase in size and number.

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BACTERIOLOGICAL FINDINGS IN THE URINE IN CASES OF KIDNEY PTOSIS.*

BY

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THE full estimate of the value that is to be derived from the bacteriological examination of the urine for the purposes of diagnosis has not yet been reached. However, the simple presence of bacteria in the urine is not diagnostic of urogenital tract infection.

The experimental intravenous injection of cultures results in the appearance of the germ in the urine after a short interval of time. The typhoid bacillus and other germs free in the blood in disease, are recoverable from the urine by culture. These facts justify the conclusion that the kidney has a germ excreting function, and that the urine is not sufficiently germicidal to destroy all the bacteria.

That the urine has in itself when normal a certain amount of germicidal power, is the opinion of some observers. This is shown by the preliminary decrease of bacteria that occurs the first few hours after voiding. The action is not marked, for under the slight modification from moderate degrees of heat or exposure to air it disappears and then the urine becomes a good culture medium. This would point to a ferment rather than a chemical ingredient as a cause for the germicidal power, though Guiteras claims that it is the acid potassium phosphate that is the protector.

On the other hand, urine from an infected bladder or kidney probably loses its germicidal power through chemical changes previous to voiding and a rapid increase in the number of bacteria continues.

In using a plate culture to determine the number of germs, it is important to allow as little time as possible to intervene between the catheterization of the patient and the inoculation of the culture medium, since the variation in the germ content of the urine will naturally modify the results and depreciate the value of the findings. However, simply for purposes of diagnosis, aside from strictly scien-

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tific investigation, the variation in twelve hours' time is not of great consequence.

A catheterized specimen is essential for results of value, since it is important to eliminate urethral contamination. A more uniform specimen is probably obtained by discarding the first few cubic centimeters, and in cases of bladder stasis, I prefer to discard also what would naturally be the residual urine.

The consensus of opinion is that urine in normal individuals is free from germs. On the other hand, some observers report finding a considerable percentage of presumably healthy individuals, whose urine contained bacteria. Many individuals with absolutely no urinary tract symptoms may have the urine loaded with germs.

Brown in Osler's *Modern Medicine* says: "It is important to remember that the epithelium of this tract is extremely resistant to infection, and that in the vast majority of cases certain predisposing factors must be met with before inflammation is set up. The weight of evidence, however, certainly points to the belief that the urine of healthy individuals, if obtained under careful precautions, contains no bacteria. That the organs and urine of absolutely normal individuals are free from bacteria, has the weight of authority, and thus, at the present time at least, it is not fair to assume that we may have autogenous infections of the kidney."

These and other authorities thus give sufficient indirect proof of the necessity of a complicating factor for the continuation of acute inflammations in the urinary tract.

The conclusion that a predisposing factor must be present in addition to the bacteria in the urine to give rise to infection is necessarily correct if such findings of bacterial contaminated urine are frequent.

The experimental results obtained by various observers in producing bladder infections by ligation of the urethra following subperitoneal, intravenous or rectal injections of cultures are conclusive of the necessity of the presence of a mechanical factor associated with the germ in the urine, but offer little proof of the path of germ travel to the bladder.

The source of infection in women may be through the urethra, from the blood stream or as direct extension from adjacent organs. The direct extension was clinically proven by Reymond in 1893, who after ligation of the urethra and injection under the bladder peritoneum recovered the germs from the urine in the inflamed bladder, but found the kidney, urine,^rand blood sterile. The pathogenic germ of pelvic lesions in women is often recoverable from the

urine of the uninflamed bladder, and yet is not found in the kidney urine or the blood. This is notably so in the diphtheroid bacillus infections of the cervix and vagina. While a direct extension is possible, the course through the urethra is more likely. In Raymond's experiment by the tying of the urethra, a factor of violence was added through the overdilatation of the bladder sufficient to force the germs through the wall and so to produce a cystitis. A factor of violence even for a moderate degree is sufficient to produce a cystitis in women, but its permanency will depend on the pathology present and induced.

The possibility of autogenous infection, though denied by some men, has many findings in its favor, but the need of mechanical interference to the urine flow in addition seems important.

Acute inflammations of the bladder are as a whole of short duration in an organ that has perfect drainage. The chronic conditions are almost invariably associated with interference to complete emptying that is not necessarily associated alone with bladder complications, but often a stasis that is the result of other pelvic pathology.

Acute pyelitis following or associated with general infections will also respond readily to medicinal treatment when the kidney drainage is free. The infection associated with imperfect drainage is the one that becomes chronic and resistant to treatment. Hunner reports such cases cured by dilatation of ureter strictures. Edebohls, Box, and Newman have reported unilateral nephritis cured by kidney fixation. In discussing their reports, Dieulafoy says:

"Edebohls, Box, and Newman have claimed to cure one-sided nephritis by fixing a movable kidney—cases where the kidney was enlarged, painful, and the albumin abundant. The movable kidney was supposed to be exempt from lesions for a long time. Although the cases reported by Edebohls do not give all the medical details of the question, it is none the less true that people with movable kidneys have albuminuria. The albumin is present in 14 per cent. according to Schilling. The term Bright's disease implies the idea of bilateral nephritis. The presence of albumin and casts in the urine is not sufficient to prompt the diagnosis of Bright's disease. This confusion is made by surgeons. It may falsify our ideas. I am of the opinion that some of the cases are due to tuberculosis. In some of the published cases, nevertheless, it does seem that tuberculosis was not present and that they were really cases of chronic unilateral nephritis without pain and hematuria. It is certain that results of surgical intervention are often excellent in unilateral acute or chronic nephritis, but it is indispensable to state clearly the indications and contraindications and select cases amenable to operation.

For the time being, we are unable to answer this question because many of the published accounts are incomplete from a medical point of view. I am convinced, however, that this gap will soon be filled."

This paper is based upon the bacteriological examinations of the urine made in cases of kidney ptosis only. It does not include results from the urine of patients with general enteroptosis. The acute kidney infections, the pus kidney and the tuberculous infections are not considered, nor any case of ureter stricture.

The acute infections of the kidney are mostly associated with general systemic involvements. Where resistance is low or the virulence great, the breaking down of the parenchyma takes place and the "pus" kidney develops. Otherwise the process subsides, responding more or less promptly to therapeutic measures. Any interference with the urine escape favors chronicity and the pathology becomes resistant to medication. In a tuberculosis of the organ a very different process exists which places the condition in a class by itself even if a kidney ptosis is associated.

Outside of the "unilateral nephritis" so-called, the movable kidney has always been treated with little individual consideration of the various phenomena found. The kidney truly giving trouble was not distinguished from the latent case so that at the present time a diagnosis of this particular pathology is accepted by the profession with mistrust.

Thus we have been dealing with the question from the gross statistic viewpoint and overlooking the significance of individual findings.

"It is less than ten years," says Mayo, "since nephrorrhaphy, ventrofixation, gastrorrhaphy, and kindred operations were resorted to on indications which would not be accepted to-day. We have come to appreciate the fact that comparatively few of the abdominal viscera have unchangeable anatomic characteristics and that variations within limits are not to be considered abnormal."

This is the usual method of disposing of the movable kidney, yet when kidney ptosis is considered from a more specific point of view, it is essential to find some basis for determining and classifying those cases that are of pathological significance.

Justification exists for a grouping of these cases into four types. The first type is the class of cases written of as "unilateral nephritis." These are practically all right-sided. The kidney is low, easily palpable, tender to the touch and somewhat enlarged. There is bladder irritability, but inspection reveals nothing but possibly

a congested mucous membrane, with a reddening of the right ureter orifice. The urine shows some albumin and pus, a few casts and numerous bacteria, but these findings vary from day to day. The patient complains of a dragging feeling with dull pain in the right lumbar and hypochondriac regions. There is tenderness and occasionally pain over the spinal exits of the lumbar vertebræ. These cases seldom exhibit Dietl's crises, but are often associated with periodical uremic attacks evidenced by headache, fever, puffiness of the face, and lessening of the urine' output.

The classification of this pathology as a "unilateral nephritis" is not technically correct for the term nephritis is too intimately associated with Bright's disease to convey any other impression. Such cases are invariably germ involvements of the kidney pelvis, and what changes take place in the kidney parenchyma are wholly secondary to the infection.

Into the second class of kidney ptosis cases may be placed those that give definite Dietl's crises. These attacks of pain most frequently come if the patient suddenly assumes the standing posture. They are accompanied by faintness and occasionally a variation in urine secretion, not only as to quantity but also in chemical and microscopical findings. The symptoms are relieved by the recumbent posture and the attack may be followed by a tenderness of the kidney, persisting for a few hours. During the interval the urine may exhibit absolutely no abnormal changes. There are occasional cases that must come under this heading where the pain is not present, but a sudden fainting is the primary symptom. It may be that these patients are extremely susceptible to pain and that the complete unconsciousness is the result of the pain stimulus, but that symptom is forgotten. The suggestion of Dr. R. A. Archibald that anaphylaxis may enter largely into this type of uremic attack is of interest.

Anaphylaxis, or allergy, as Von Pirquet terms it, depends on periodic proteid splitting, the absorption of these split products giving rise to definite clinical symptoms peculiar to the type of proteid present, but necessarily these periods of abnormality must be separated by a considerable interval of normal metabolism. It is reasonable to suppose that in a patient with free urine drainage which suddenly becomes disturbed, the chemical changes taking place can readily cause marked disturbance. The two patients that I have seen with this type of attack have had more marked urine changes and more prolonged uremic symptoms than those patients with classical crises. Since the ptosis was corrected, these

patients have had no recurrence of their fainting spells. These two groups are well-recognized pathological entities.

Under the third group should come the cases that might be said to be of questionable etiological importance. It is of this class of cases of which Strumpell says: "In a great majority of cases of floating kidney we have to do with those familiar and frequent conditions of a nervous character which are termed hysteria or neurasthenia. It is not always advisable to apprise the patient of the fact, for with a person of this sort the mere idea of possessing a 'floating kidney' is enough to stir up a host of subjective symptoms—unless you wish to use it for suggestive therapeutics." And Osler states: "Far too much attention is given to the condition which is often associated with neurasthenia."

The kidney is readily palpable, the left almost as frequently as the right. The organ may not necessarily be tender and usually is only slightly enlarged. The patient complains of sideache and some backache with occasional irritability of the bladder. The nervous symptoms are often marked and of almost any type. If the right kidney is the one at fault, digestive disturbances are present due to the close relation of the cecum and kidney.

The examination of the bladder is usually negative, the urine may show absolutely no changes, except from the bacteriological side; but, if the germ present is in excess, a trace of albumin and a few casts are found. In these cases, as well as in the "unilateral nephritis" type, the urine will escape from the catheter without the normal rhythm. This continuous drop flow has been counted by some men as being diagnostic of the presence of the catheter within the kidney pelvis. The character of the flow is only indicative of the catheter having reached a dilated portion of the ureter or that the peristaltic contraction of the kidney pelvis and ureter is disturbed. The results of the bacteriological examination of the urine are in this type of case of most significance as an aid to diagnosis.

Under the fourth head are classified the patients with kidney ptosis in whom no symptoms can be found traceable to the condition and who show on urine examination a relatively sterile urine. I say relatively sterile urine because only a small per cent. of specimens are absolutely free of germs. Out of one hundred and twenty-five examinations made in the type of case under consideration there were only three specimens absolutely sterile.

With the hope of getting determinations of greater value from a clinical standpoint, we have with the last sixty-five cases of kidney ptosis, plated a cubic centimeter of urine and counted the number of

colonies developing in twenty-four hours. Out of the one hundred and twenty-two examinations in which growths were obtained, twenty-six patients that could not at the time be considered as suffering from the effects of the kidney displacement, gave after this method twenty or less colonies per cubic centimeter in thirty-two examinations.

In the sixty-five patients investigated, there were five suffering with definite crises, two with marked associated uremic symptoms. In two of these cases, one with uremic symptoms, the urine had never more than twenty colonies to the centimeter even following a marked attack and the urine was without variation in the two kidneys. The other two individuals had more definite local kidney symptoms and the urine upon culture gave counts varying from two hundred and ninety-four germs per cubic centimeter upward to an uncountable number. After operation on these two patients to correct the kidney displacement, the count dropped to below twenty per cubic centimeter, and has remained so consistently for over six months associated with perfect general health.

Four cases of unilateral nephritis of the right kidney have been carefully investigated. Two have been cured by operation, two improved by corsets and treatment. Cystoscopic examination in each case showed negative bladder findings except for some congestion of the orifice of the right ureter. The kidney function was not impaired; the quantity secreted by the separate kidneys was not equal. In three cases the larger quantity came from the abnormal side, but of decreased specific gravity. On this side also there was no rhythm to the discharge. The bacteriological count differed in each kidney, the number on the right side being uncountable. On the left not over four hundred appeared in any examination. In all cases there was a mixed infection. Careful guinea-pig inoculations gave no evidence of tuberculosis.

The character of any kidney infection will depend on the primary location, the type and virulence of the germ, and the patient's resistance. A severe involvement in the parenchyma will lead to abscess formation and kidney destruction. Rosenow's findings that the selective tendency of germs depend on the type of virulence may possibly account for either a parenchyma or a kidney pelvis involvement.

Tuberculosis of the kidney must be considered in a different class from these other infections of the kidney pelvis. The tuberculous and the pus kidney are not curable by fixation and are treated by incision or removal.

The unilateral nephritis is essentially a kidney pelvis condition

with a certain amount of parenchyma congestion as a sequela. It is devoid of the systemic and blood signs of an acute septic condition. It is invariably imposed upon a displaced kidney and the condition promptly responds to operative replacement of the organ that permits improved drainage. When treated by corset support and therapeutic measures, improvement takes place, but there is a tendency to recurrence of the more acute symptoms.

The corset support promptly decreases the bacterial count to a marked degree, but during the exacerbations the increase is again rapid. A woman of sixty-five, whose attack occurred a year ago following the gripe, had on the diseased right side an uncountable number of germs, but on the left side four hundred and thirty-two to the cubic centimeter. The corset correction reduced the count on both sides to less than half the number. In two other nonoperated cases the results were even more marked.

In the two cases operated upon the bacteria practically disappeared from the urine within a few months, the decrease being uniform and rapid. The symptoms were relieved immediately; the patients promptly gained in weight and had no recurrence of the uremic signs.

Patients with unilateral nephritis always show the presence of a considerable number of bacteria in the urine from the supposedly normal side. Yet in the urine of this side the decrease of bacteria takes place much more rapidly following surgical treatment or corset correction of the abnormal kidney.

The findings in the class of cases listed as of questionable etiology were also well marked. Six of these patients had had pelvic operative work done, but with slight improvement. The kidneys had been overlooked because of the lack of marked definite symptoms. The number of bacteria in the urine never reached the amount found in the "unilateral" type, but corset correction always produced a marked decrease—with a prompt increase if omitted. With the lessening of the germ the symptoms disappeared to reoccur when the count again increased.

The factor at fault is without doubt poor drainage, which through chemical changes produces a suitable culture medium for germ increase. The number of bacteria is then relatively an indication of the degree of stasis.

If we can eliminate the cases that have a bacterial count, depending upon a bladder involvement that is the result of bladder ptosis, or upon pelvic inflammation, in a patient with kidney ptosis, we have an index in a measure of the disturbance the condition produces.

The type of germ found seems to be of little importance, probably due to the resistance of these mucous membranes to infection.

The varieties will vary in the same individual from time to time and as a rule a pure culture is seldom present. The resistance of some bacteria to plate culture will offer some element of inaccuracy and necessitate a tube growth for checking, especially in cases severe enough for vaccine therapy.

The taking by the patient of any hexamethylenamine compound as a urinary antiseptic has a marked influence upon the count, even though free formaldehyde is not present in the urine.

The results obtained so far from the bacteriological examinations in these cases seem to justify the conclusion that urine containing a relatively small number of germs may be considered normal. In individual cases the results have been so uniform that it proves we have practically eliminated urethral contamination. In seemingly normal individuals a perfectly sterile urine is rare, and this must emphasize the fact that bacteria are being constantly eliminated by the kidneys. Taken in conjunction with the experimental inoculations and the occurrence of germs in the urine in systemic infections, it is essential to acknowledge a germ secreting function to the kidney. This factor necessarily increases the importance of the presence of a kidney ptosis that may interfere with drainage.

We are too prone to accept too fully the advice of the men who have vast experience and publish extensive statistics. We forget that it is the individual we treat and not the disease and that what with one individual may be pathology of little moment to another of more sensitive disposition may be vital.

With the kidney ptosis of no matter what degree, the question of its bearing on the patient's health is one of individual determination and usually by careful investigation and proper therapeutic measures, its importance can be determined before operative measures are instituted.

The amount of trouble from the ptosis depends more upon the interference with the urine flow and the amount of stasis produced than upon the particular location of the organ.

The stasis alone may result in symptoms of a uremic character, but from the kind of infection imposed will depend the degree of general pathological disturbance.

The sensitiveness of the patient to defective physiology has a great influence upon the degree of stasis and the amount of infection necessary to give rise to symptoms essentially pathologic.

If the peristaltic action of the kidney pelvis and the ureter is per-

fect (unless an acute obstruction occurs as indicated by crises) the ptosis can be accepted as one not requiring correction, but we must realize that in every such individual the foundation for future trouble is present.

APPENDICITIS AS A CAUSE OF CECAL STASIS.

BY

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SYNOPSIS.—Nearly every case of appendicitis is chronic when recognized clinically. Many cases of appendicitis of long standing run without characteristic or striking clinical symptoms. Anatomical findings: Pericecal membranes are a common accompaniment of appendicitis of cecal stasis. Interdependence of both conditions. Cecum mobile of Wilms, so designated, is in most instances not a congenital condition, but is due to chronic appendicitis resulting in contraction of the posterior cecal wall, and prolapse and bulging of the anterior cecal wall. Inter-relation of latter condition, and floating kidney and duodenal stasis. Simple and full transverse division of pericecal and ileal membranes necessary to a cure. Colon surgery (short-circuiting operations) unnecessary. Ante-operative and post-operative treatment. Results.

Modern medical literature is impressively clear and convincing in attributing to imperfect evacuation of the colon and the proximal ileum an intoxication having a blighting effect upon all organs of the body. The numerous essays upon this subject, as yet, vary in their different conception of the etiology of this stasis, the construction of its evil effects, and the method of treatment employed. This state calls for further elucidation.

Different parts of the intestinal tract may be the seat of the stasis. It is important to find in each case the particular locality involved. The acute stasis as observed in cases of acute general sepsis, and as occurs in cases of localized abdominal infection whereby certain parts of the intestinal tract are fixed and obstructive lesion follows, and as supervenes in diffuse peritonitis accompanied with general distention and agglutination of intestines, has long been recognized and duly accounted. But the insidious effects of circumscribed subacute

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infections, and localized mechanical hindrances to intestinal movement, have been relatively little studied in their variable pathogenic and clinical manifestations.

The object of this paper is to emphasize the stasis resulting from appendicitis; and more particularly to call attention to a subacute form of appendicitis, which, though it does not give rise to striking clinical symptoms calling for an immediate operation, is because of its frequency and baneful effects of serious importance. Commonly these cases go without recognition. Practically every case of appendicitis "cured" by medicines, and many cases that have been operated upon without attention having been given to pericecal membranes, afterward suffer from intestinal stasis.

As early as 1890, Eulenberg published his painstaking research into the pathohistology of appendicitis, which clearly revealed that appendicitis is essentially a subacute or chronic inflammatory disease; that it commonly has a subacute beginning without obstructive clinical symptoms; and that the acute symptoms manifesting it clinically, are but a critical phase of a long-standing disease. In the years that have since gone by, but little has been added to this conception of the disease, and nothing to contrafute it, although but few men have given to this statement its commensurate consideration. This conception of the pathology alone, by *a priori* reasoning, should lead us to expect that an inflammatory involvement of the various layers of the appendix will by direct contact involve adjacent organs; and that the rich lymphatic structures of the appendix will carry through their lymph channels the infection to other organs, such as the mesentery, cecum, ileum, kidney and liver. Pyelitis and cholecystitis, as etiologically associated with *acute* appendicitis, have long been recognized clinically, but their development from subacute and chronic appendicitis and from the stasis of pericecal membranes is yet insufficiently considered.

The writer has many years methodically looked for and treated these periappendiceal changes. In this practice he precedes many whose names are now prominently connected with anatomical findings and surgical procedures. Upon such experience it may here be said that an appendicitis, which at the operation does not show gross evidences of chronic periappendiceal involvement, is relatively rare. Even cases owing to exanthematous diseases—where the acute appendicitis indicates the primary eruption upon a mucous membrane which appears upon the skin a little later, as in small-pox typhoid fever or scarlatina—the anatomical sequelæ of subacute or chronic appendicitis are commonly found.

The causative and interchanging relation that these anatomical bands and membranes and their sequential angulation and distortion of the bowels have upon stasis, and, inversely, what bearing stasis by low grade of osmotic infection and toxic inflammation has upon producing the former, need not here be considered. They are set forth sufficiently in the recent profuse literature. For the same reason the contention over what should be regarded as essentially a congenital band, as contrasted with an adventitious formation, may be omitted. It is sufficient to recognize that where congenital, prenatal and postnatal formations disturb intestinal function, they are *conditions demanding treatment*. Those who do not find these anatomical changes, or discover them rarely, fail simply for want of thorough search. The phenomena of intestinal stasis, or as stated comprehensively, the symptoms indicative of a *systemic intoxication*, require no restatement here. However, it shall be regarded imperative that their presence in a given case should, invariably, lead to a thorough search for the active cause or causes, such as intestinal stasis, suppurative tonsillitis, dental decay, tuberculosis, chronic malaria, etc.

The signs and symptoms of special significance in the diagnosis of chronic subacute appendicitis shall here be given.

Constipation is an almost invariable symptom. It must be clearly understood that a single daily movement, as bona fide evidence that constipation does not prevail, is incorrect. A single daily movement indicates commonly only the discharge of the lowermost part of a more or less extended fecal column. In some instances intermittent attacks of diarrhea are associated with this form of coprostasis. They must be regarded as nature's attempt to remedy the constipation. In other words, an intermittent diarrhea rather points to the existence of constipation. Rectal touch and exterior abdominal palpation will reveal the impacted condition of the great bowel; and the large masses moved by the administration of cathartics makes proof final.

Colic, in the ileo-cecal region of transient duration, commonly of mild degree, is present in most of these cases. The long time sufferance of this colic has often created a tolerance for it by which the patient fails to consciously note it. But the patient who denies its occurrence to the direct question, will often report later that not only has he observed it since his attention has been called to it, but that now he recalls its previous occurrence.

Abdominal touch. Pray let it be the delicate touch employed by the blind man in substituting his lost vision, not the forceful

physical contact as ordinarily inflicted, by which the tactile sense is blunted! I repeat, abdominal touch in these cases easily reveals the deformed, distorted and dislodged cecum. Gentle palpation, avoiding contraction of the underlying parietal musculature, may reveal the outline of the cecum, its often thickened and increased resistant wall, and its variable contents of fluid, or of impacted or mushy masses. Many cases show the cecum to extend as low as Poupart's ligament. At times it is narrow, thickened and resistant, banana-like in form, extending along the outer wall of the abdomen; again, it may differ in contour according to the formation and incursion by bands, or membranes, covering part or all of the cecum. In other cases the low cecum is readily recognized as a wide organ; it may reach to and beyond the median line; it may be fixed; it may be freely movable and easily shoved inward or upward; or it may be found high up, compressed, thickened and resistant.

In many cases where the cecum extends low there is palpable tenderness and constriction of the cecum at McBurney's point. There is also tenderness, associated with muscular rigidity, in the lumbar region. This tenderness may be elicited upon gentle pressure, which reveals the presence of a mild degree of rigidity in the overlying musculature, rather than by the subjective symptoms of tenderness and pain. Tenderness and rigidity in the lumbar region commonly indicate an appendix in high retrocecal location, and may be associated with longitudinal contraction of the posterior wall, and prolapse of the anterior wall of the cecum. At the operation the mesenterium is often found contracted into a hard scar band; the appendix is drawn upward and behind the cecum, where it is plastered down or even hidden in a cecal fold. When this is the case it presents various conditions of contraction, thickening, angulation, dilatation, or stenosis. An extensive region may become involved in this cicatricial contraction and membranous hooding-in; and, as a consequence, there is marked shortening of the posterior cecal and colic wall, and distortion, displacement and angulation of the adjacent ileum. Ultimately there is produced what must be regarded a compensatory dilatation bulging and lengthening of the anterior cecal wall. By this deformity the circular fibers of the intestine suffer great disarrangement. The posterior muscular structures become bunched and contracted, while the corresponding anterior musculature stretches greatly and retains no longer the normal apposite relation to its fellow posterior segment. This state, combined with the influx of the heavy fluid contents from the small bowel, naturally produces an abnormal anatomic

state. This condition is easily mistaken for a *cecum mobile* of Wilms. It is very important the two be not confounded. The *cecum mobile* of Wilms, as a congenital condition, is relatively rare; while the protuberant and elongated anterior cecal wall, resembling it, is of common occurrence.

The thorough division of the adventitious membranes and contracting scars releases the cecum and ascending colon fully, and it is then easily differentiated from the ptotic cecum of Wilms. Later, palpatory evidence, even during the short time the patient remains at the hospital, will reveal a notable retraction of the cecum, *i. e.*, of the anterior wall of the cecum. The valuable aid in diagnosis by radiography needs no mentioning here. Palpatory findings are here dwelt upon as being immediately available and, at least, relatively reliable.

Another observation of great collateral interest ought to be noted. In cases where the right kidney was found low and floating, and giving rise to characteristic symptoms, after releasing these bands and membranes, the kidney is commonly found ascended, and the relative symptoms have vanished. This observation touches upon Edebohl's findings of many years ago; namely, that floating kidney and appendicitis are usually associated. While Edebohls placed stress upon the kidney as the primary causative factor, it seems more reasonable to regard chronic appendicitis as the main etiologic element in this condition. Of vital relation to this subject is the recent addition to our knowledge of the anatomy of the kidney by our esteemed fellow, Dr. Longyear. The fibrous teniæ of the cecum, in their continuation upward on the posterior surface of the cecum and ascending colon, constitute the nephrocolic ligament of Longyear. This reaches up to the lower pole of the kidney. At this point the nephrocolic ligament divides into its component strings, which, like the ropes of a balloon, support the perirenal fat.

The contraction of the posterior cecal and colic wall, following this form of retrocecal appendicitis, eventually affects and shortens the nephrocolic ligament and causes displacement and distress of the kidney. Likewise the accompanying distortion and upward displacement of the appendiceal and adjoining ileal mesentery disarrange the relation of the ileum to the cecum and ileo-cecal valve. The anatomical relation these various parts and organs hold to the duodenum effects an angulation, distortion and obstructive interference with the emptying of the duodenum. As a matter of fact, it has often been observed that nephropexy has given relief to

duodenal stress. In my observation, the extensive surgical division of post-cecal contractions and membranes has frequently given full relief from the duodenal symptoms.

With the incident distortion of the adjoining ileal loop, this loop is often found tender. The forced efforts, necessary to propel its contents through a constricted kinked lumen, account for this; and careful palpation reveals this ileal tenderness.

The cecum can also be mapped out positively by lightest *palpatory percussion*. The sameness of resonance may be construed to signify one continuous organ. In going beyond the cecum, this manipulation will reveal variations in the resonant note, as, for instance, it becomes higher when a small intestinal loop is covered by the percussed and palpating finger.

If now the lateral abdomen is gently compressed with the left hand, by the thumb in front and the fingers behind at a point above the ileum, while the right hand makes pressure upon the lower cecum, this part cannot only be mapped out quite distinctly but, by the sensation of the bowel contents moving upward under the fingers of the left hand, this can be definitely recognized as being the cecum. In other words, the bowel felt below the compressing right hand, may be looked upon with certainty as being the prolonged cecum. These various findings lose their early problematic reading when, time after time and with only occasional erring, the subsequent operation has shown the actual anatomical condition to tally with the previous palpatory reading.

Oral temperature, in these cases, is ordinarily subnormal; whereas the *rectal* temperature frequently records over 99° F. At times, when there is subacute infection or an acute exacerbation of even a very circumscribed process within the appendix or cecum, the rectum will show one or more degrees above 99, while the oral temperature is normal or below the normal.

That disease of the cecum calls out a rectal reflex has long been known, and, as in ileocecal intussusception, rectal tenesmus is almost constantly present. In concourse manner these cases of ileal cecal stasis will commonly reveal concomitant *rectal stasis*, even where there is no local (rectal) cause for constipation. Another evidence of chronic cecal stasis is the difficulty often observed of clearing the cecum. Notwithstanding cathartics, followed by copious enemata, the cecal impaction persists more or less. Attacks of general acute malaise with muscular pains, anorexia, coated tongue and tenderness in the region of the cecum, are frequently attendant upon such efforts at evacuation. The feces during these attacks

often contain mucus; sometimes, but rarely; blood, and have a very foul odor. Most characteristic of this condition are little hard fecal plates of off-color. They represent scybala that have been closely adherent to the bowel walls for a long time. By the side of these, softer feces may have passed for days and weeks without dislodging the former. A moderate elevation of the rectal temperature may be observed, synchronously, with their discharge. At the operation these hardened scybala can be found firmly attached to the interior of the scalloped parts of the cecum. It is hard or it may be impossible to separate them from the bowel wall without undue force. After the operation, and under catharsis when such scybala are being passed, the systemic symptoms above mentioned can be regularly observed; thus the relation of one to the other is proven.

Most of these patients may be found a long time at their regular vocation totally unconscious of the insidious depreciation of their vitality and strength. But their listlessness, nervousness, lack of vigor and endurance are apparent. The efficiency of such individuals is often reduced 25 to 50 per cent. and more. Their invalidism may lead them to abandon their usual occupation, and predispose them to intercurrent disease. This class of patients gives us our fatalities, or slow recoveries through acute infectious disease, or through insults attending the operation. The sum total of chronic toxemic patients is legion, and a large per cent. is due to intestinal stasis.

The anatomical and symptomatic diagnosis of chronic subacute appendicitis should lead to operative relief as quickly, as is practised in the case of so-called acute appendicitis. In advanced cases an immediate operation may be fraught with evil. The psychical and physical shock of an operation and the toxic effect of the general narcosis, may result disastrously in further invalidizing the patient by retarding recovery or, possibly, by an immediate fatal termination of the case. It is here good judgment should be used. When the skin is dry and shrunken, the urine of low specific gravity, the liver small and shriveled secreting bile that fails to color the stool, and when there are other nervous and physical phenomena indicative of greatly depreciated functional activity in various organs an operation is out of the question! It is now that the medical, dietetic and hygienic treatment, which must be an obligatory feature of the case for a year and longer, is the proper procedure. Let it be understood that the blighting effect of this stasis is essentially *glandular* in character. Both the excretory and the secretory organs are

primarily involved. Their restitution, it may be said, is the object of all treatment.

Treatment.—A daily (preferably at night) warm bath, including thorough soap-massage and forceful crash-towel drying; the free imbibition of fluids; bulky, largely vegetable diet; daily moderate exercise; prolonged periods of rest, from twelve to eighteen hours daily; warm clothing by day and extra warm covers when lying down; cheerful environment; various sodium salts given alternately and taken in large quantities of hot water; phenolphthalein, podophyllin, and aloin in doses sufficient to produce three to four bowel movements daily; and, last but not least, a constant medical supervision will suggest the steps to be pursued not only in preparing the patient for an operation, but also for a long period after an operation.

The physician's duty in these cases is most trying. These patients are inherently laggards; they have no carrying strength of their own. Their lack of force, for the time, has to be supplanted by that of the physician and nurse. Only when the latter render earnest, capable, and persistent efforts, can results be accomplished. The many failures before an operation, through an operation, after an operation, and without an operation, attest that the medical treatment outlined above is not adequately enforced. Even in seemingly hopeless cases, remarkable and permanent results may be obtained. These patients are the most grateful we have. They realize the importance of the strict discipline to which they were subjected. Their restoration to health is an ever conscious perception.

Operation.—All of the above described varieties of appendicitis operated upon away from an acute stage, must be attacked through an abdominal incision of sufficient length for full exposure of the field to answer all purposes. The simple transverse division of bands and membranes, wherever they constrict or abnormally tie down the bowel in all its layers, though they be many, should be done with thoroughness and largely by instrumental touch. More than simple division of the membranes or bands from the underlying bowel is not necessary, except in rare cases. After this treatment the cecum and ilium should be held in natural apposition without constriction or strain. The ileum shall feed into the cecum from the left at right angle as is natural. The cicatricial tissue, of which these adventitious structures consist, has the character to retract upon itself. Nature here accomplishes without complication what the less delicate hand of the surgeon cannot do. Reformation of these bands and membranes is rare. When they do reform, or adhesions take

place, it must be attributed to unnecessary manipulation, or an infection at the time of the operation, or to subsequent stasis and reinfection.

It is a fact, daily observed at operations, that these membranes and bands find scant consideration and treatment by most operators. It stands to reason, therefore, that naught but a complete division of these bands and membranes can prevent the repetition of stasis. Judicious and skilled handling will not entail traumatism and infection and hence there will be no recurrence of bands and membranes. Subsequent wary treatment of these cases is an essential too often woefully slighted.

Here are some of the results obtained: Urine of the specific gravity of 1002, has come up to 1015 and 1018; the light yellow and even clay-colored stools, have gradually come back to their proper brown; a liver, measuring 2 inches in the axillary line, has resumed its normal scope; the skin, a stranger to perspiration for years, assumes a natural moisture; desk work, discontinued for years, has been resumed; a dulled intellect has brightened to old-time vivacity; and the always present lassitude and lack of endurance, have yielded to former vigor and endurance.

The fact that the writer has been lying low for a case indicating a short-circuiting operation, and found none, may be taken as an indication of the strength of his convictions.

601 HUME-MANSUR BUILDING.

DISCUSSION.

DR. DAVID HADDEN, Oakland, California.—In connection with Dr. Pantzer's paper, it might be of interest to mention that the three cases of unilateral nephritis reported in my paper had had their appendices removed. The relation between the cecal stasis and the kidney ptosis was shown nicely in some cases that I investigated from the bacteriological side. In these cases the appendix had been removed, but the kidney not fixed yet the bacteria in the urine decreased rapidly with the improvement in the patient's general condition.

PLASTIC OPERATION FOR CORRECTION OF CECOCOLON
STASIS.*

BY

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(With three illustrations.)

EXPERTS declare that if complete combustion could be attained, not only would the nuisance of smoke and the inconvenience of ashes be eliminated, but the amount of energy would be doubled. It is likewise evident that if digestion were perfect and absorption complete, there would be no residue of ingested material in the intestinal tract. Were this to avail the individual could be spared considerable inconvenience, saved much distress, and would be free from various conditions that impose discomfort and menace health. What does prevail is that much of the food intake is only imperfectly digested with comparatively small amount of absorption, and there remains much material to be carried off through the outlet of the intestinal tract. For this elimination nature has provided, which provision is adequate when the machinery is properly constructed and remains in a healthy working condition. When, however, the parts which perform this function are improperly constructed and by that deformity, or by existing malposition of these parts the onward and outward course of this waste material is unduly delayed the organism suffers. This material has experienced and is still capable of further experiencing various chemical changes; all of which are not beneficial, and some of which are distinctly deleterious to the individual in whom their products are present. This material possesses also favorable elements and conditions that are suitable for the propagation of bacteria. The entrance into the circulation of these organisms, or the absorption of their products, becomes a menace to health.

The anatomical structures to be reckoned with in considering fecal stasis are the respective portions of the small bowel and sections of the colon. In so much as the material in its course through the small bowel is liquid, impairment to its progress in this department

* Read before the American Association of Obstetricians and Gynecologists at Buffalo, Sept. 15-17, 1914.

is rare. Emptying itself as it does from the small caliber of the ileum into the larger cecal basin, this material slows its current and stagnates. This stagnation is further favored when the cecum is distended, whereby the volume accommodation is increased; gravity handicaps the upward and onward flow; and the propulsive force is lessened. It is this part of the intestinal tract that most favors stasis and becomes the most frequent offender in establishing and maintaining this pathology. In so much as the condition causing the stasis is physical and by its own existence the condition is self-perpetuating and progressive in order to find the remedy one needs to correct its cause. The cause is physical and invites physical correction. Such correction must have for its object the reduction of the retention cavity and a means that favors a speedier moving-on of the contents.

A simple method suggested itself to me some months ago when I was confronted with a greatly overdistended cecum and colon exhibited during operation. It was in a patient upon whom I was correcting a uterine retrodisplacement and removing a chronic diseased appendix. This patient gave the history of the stasis syndrome covering a period of over eight years and was viewed as a chronic "complainer". Her distress had been increased after childbirth by the superimposed dragging of the uterus, but her stasis syndrome antedated the pregnancy. The fulness, distress, and aching in the right lower quadrant was pronounced; and, with these symptoms were the cold moisture of the surface, anorexia, nervousness and weakness. During the operation the cecum presented as a ballooned pouch involving most of the ascending colon. The sac expanded below the ileocolic juncture and was of sufficient dimensions to accommodate approximately a pint volume. The anterior *tenia coli* was correspondingly elongated.

I observed that the portion of the wall lying between the anterior and the external bands was most generous in sharing the increased capacity. I tried to bring these bands together and was gratified at the evident reduction in the caliber of the colon by so doing. Then it was attempted to bring the cecum up and fix it out of the pelvis. This responded to a simple device by approximating the dependent portion of the anterior band with the external band at a position sufficiently high that when the points were fastened together the cecal sac disappeared. The method, a description of which is here subjoined, was then applied.

The operation aims to elevate the cecum and reduce the retention capacity of the ascending colon. It restricts the caliber of the colon and eliminates the cecal pouch. This is accomplished by approxi-

mating two of the three longitudinal fibrous bands which enter into the formation of the colon wall. The operation has to do with the external and the anterior bands which structures are brought together in such manner as to invaginate that part of the bowel lying between. The appendix having been removed and the stump invaginated and covered, the most dependent point in the anterior fibrous band is caught by a Lembert suture of nonabsorbable thread, which suture is carried sufficiently high for its attachment in the external band that when tightened the bottom of the cecum is brought to a level with the ileocecal juncture. Sufficient interrupted Lembert sutures are then placed to completely approximate these two bands in line of their course from their origin at the base of the appendix to the site of the first suture. Additional sutures of the same type are placed above the first suture to the point where the



caliber of the colon ceases to be dilated or to the hepatic flexure. A continuous suture is then placed bringing the serosa over the interrupted suture and thereby reinforcing the approximation by an additional line of union. This completes the operation upon the bowel. The concluding of the operation in the closing of the abdomen, as well as the entrance into the abdomen in beginning the operation, is accomplished by the method of those of recognized and proven efficiency which is preferred by the operator. The illustration diagrammatically shows by Fig. 1 the bowel before the application with the first, or guide suture in place. Fig. 2 shows the supporting interrupted sutures placed, with some of the sutures fastened. Fig. 3 shows the interrupted suture closed and the continuous suture

approximating the serosa covering, over the interrupted sutures and forming the second line of union. It also shows the eliminating of the cecal sac and the reduction of the circumference of the colon.

The second case operated upon by us gave the history of a full-fledged stasis syndrome, markedly manifested in poor nutrition in addition to those symptoms manifest in the first case. Five months of rest and forced feeding together with massage and baths and supports had failed to benefit. This case exhibited a tremendous ballooned cecum, whose dimensions were more suggestive of stomach than cecum. Invagination by the method described placed within the cavity of the colon such a bulk as to give fear of occlusion, whereupon the resection of the ascending colon was made and the distal end of the ileum was anastomosed with the transverse colon. While this patient has improved and merited expression of delight in her betterment from the family and herself, her progress has not been as rapid as the first case. I am now convinced that the resection was not called for in this case and in view of my observation and my present conviction based thereupon, I should not resect the colon in a similar experience.

The third case had been treated for intestinal stasis in various degrees for twelve years. Her syndrome was the common one with the addition of a marked mental condition with suicidal mania. She was operated upon four weeks ago. Though markedly exhausted at the time of the operation, she sustained no untoward experiences from the operation and promptly and perfectly recovered from surgical intervention. It is too early to draw a positive conclusion from her to be considered as a cure.

Although this method involved the principle made use of by Joseph Blake and previously described by him, my utilizing it was spontaneous and without the knowledge of Blake's work at that time. While the details of the method I employed differ materially with those employed by Blake, I offer this contribution to support Blake's work rather than to call attention to a claim for originality. The operation is comparatively simple for the operator, promises to correct the local defect, sacrifices no structure, and conserves the function of the part inviting a minimum risk and inconvenience to the afflicted.

The number of cases are too few and the histories insufficient to draw conclusions. Nevertheless we believe the method sufficiently meritorious in its offering with the logical and feasible argument for efficiency to commend it for consideration. It is submitted and the members invited to accept it on probation.

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1801 PACIFIC AVENUE.

DISCUSSION.

DR. CHARLES L. BONIFIELD, Cincinnati.—Some of the members will remember that I read a paper two years ago on this subject, and at the Atlantic City meeting of the American Medical Association I reported the results after two years' observation on some of the same patients.

There are two or three things I want to take up. In the first place, I have forgotten exactly how many of these operations I have done, but I think it is about eighteen, and in none of these have I found it necessary to remove the colon afterward, nor have I found symptoms on part of the colon especially troublesome. There are one or two cases that had, for the first few months, to take enemas to wash the colon out, but these symptoms soon subsided. To be absolutely frank, one patient about three months after I operated on her did have a considerable accumulation in the colon; I was out of the city at the time on account of my health, and one of my ambitious friends who I thought was exceedingly anxious to do something surgical for my patient, removed the colon. I feel sure that had I been at home and had given careful attention for a few days to this patient, the removal of her colon would not have been necessary.

I do not claim to have any special way of preventing the reflux of the contents of the bowel into the colon, but I have observed in practice one thing that Mr. Lane emphasizes as being important, and that is to make the attachment to the sigmoid at the lowest possible point. I regard this of great importance. The next point of importance, I believe, is to cut off the ileum at such a point that you may make the anastomosis without the slightest traction on the ileum. This is easily done, and leaves the ileum so that peristalsis take place without any difficulty whatever.

My experience leads me, to prefer the side to side anastomosis. Mr. Lane nearly always makes end to side anastomosis. I have done the end to side, but the side to side is easier. It is easier to bring the ileum over and attach it at the point I show you (indicating), the end being closed, and what little ileum there is below the point of attachment is folded in just as Dr. Morris so graphically described the folding of the transverse colon. In that way, there is no possible chance for any accumulation in the ileum below the anastomosis, and with this lateral anastomosis you are sure of the bowel remaining normal and healthy. The blood supply is not so apt to be interfered with.

The next point I want to make is that I appreciate the value of Dr. Pantzer's suggestion, and I believe it may be all right in certain cases, but that does not cover the ground. There are cases in which the dilated cecum is not the worst factor by any means. The first case of this sort I ever had was one in which I opened the abdomen,

fully intending to do some other plastic operation, stitch up the colon or something of that sort. I had no intention of doing a short-circuit operation, but when I lifted the transverse colon I found that if I had stretched it, it would have hung almost to the patient's knee. It was not dilated but elongated. Its caliber was lessened. In that case the caliber of the transverse colon was scarcely greater than that of the ileum, and its walls were very much thinned. To break up the adhesions around the cecum or make the cecum smaller, as Dr. Marvel has suggested, would not overcome that tremendous stretching and attenuation of the colon. So in that case I changed my mind. I was forced to short circuit because that was the only thing that offered any relief to my way of thinking.

I want to call attention again to the fact that the x-ray shows that it is not only in the cecum we have the stasis. If the pictures are taken four hours after the bismuth is taken, if you watch it, you will find it lingers at various points, and while it is longer in the cecum than in the sigmoid flexure, still it lingers all along the prolapsed thin colon. That colon has not sufficient muscular power to force the contents of the bowel along over this mountain.

The other remark I wish to make about Dr. Marvel's operation, which is ingenious, is this; in the old days, when we were doing operations for retroversion, I use to fold the round ligaments upon themselves very much after the method of Dr. Mann of Buffalo, and I had a good many recurrences, and I soon found out the reason was I was folding the round ligaments, covered with peritoneum, and when the stitches are absorbed, I had nothing left but peritoneal adhesions and the muscular coat inside stretching them out. Dr. Marvel has told us that he carefully stitches the white bands, which are strong, together, but after all it is peritoneum that unites and if the patient is allowed to get constipated, if the cecum is allowed to stretch too much, there having been dilatation in the first place, I feel sure there is at least some danger that it will stretch again.

DR. G. VAN AMBER BROWN, Detroit.—This subject of intestinal stasis is one that recently has been attracting our attention very much—a fact due largely to the x-ray observations and the deductions of different observers therefrom. The particular point I wish to refer to in connection with Dr. Pantzner's paper is intestinal stasis associated with appendicitis. I think it is Cheever who has called attention to the fact that the most frequent complication of appendicitis is postoperative intestinal stasis. We may have a paralysis consequent upon infection of the peritoneum. This is usually relieved by proper nonoperative treatment. Another class is due to mechanical twist or kink, most frequently affecting the lower ileum. Often the appendix is embedded along the lateral pelvic wall so that in tearing it loose, we leave a broad denuded area, for some reason or other the lower part of the ileum gets over in the space and becomes attached. Naturally early operative interference is necessary to save the patient.

Just Monday morning, while operating upon a patient for tumor of the trigone of bladder, in entering transperitoneally, I found this

particular condition. In March the woman had been operated upon for appendicitis, the appendix having been removed, but the pathology causing her trouble had not been removed. This was a tumor in the bladder. At the site where the appendix had been dug loose, the ileum about 6 inches above the ileocecal junction had become embedded. The woman had been suffering ever since from marked constipation. There seemed to be no reason except this for her constipation.

Regarding the *x*-ray findings, Jordan lays down this law. You will find where you have a static duodenum there is invariably stasis farther down the line at the ileum and usually at the sigmoid also; and, *vice versa*, if you find there is no dilation of the duodenum, you will find no stasis farther down. This fact should always be kept in mind in studying *x*-ray plates. Incidental to this, he further states that duodenal ulcer is a late stage in the process of bacterial infections owing its origin to intestinal stasis. It should be remembered that the duodenum is the most sensitive part of the intestinal tract and too in giving, a bismuth meal, we should not give the ordinary dose of 2 ounces, but should give as does Mr. Lacey 6 ounces.

DR. THOMAS B. NOBLE, Indianapolis.—For a long time I have been much interested in the matter of alimentary stasis, and I use the word alimentary because no one can properly review this subject without taking into consideration the entire alimentary tube. There is an analogy between the urinary apparatus and the gastrointestinal. The urine is emitted from the ends of the ureters into a reservoir where it remains, as it would seem, where nature intended it to be emptied at a convenient time. It would be very inconvenient and crippling were the urinary organs stopped at the end of the ureters and we had urine dribbling from our bodies every few seconds in three or four drop quantities. So nature has provided us with a reservoir. Likewise we find in the alimentary canal certain chambers for certain purposes shut off and guarded by certain doors or constrictions or sphincters. We find when food remains in the mouth for a time, it is ground, salivated and hurried on by sphincteric muscular activity and forced into the stomach where it remains for a while and certain processes of digestion occur out of which it is forced and shut off again by sphincteric action by the pylorus, and for a longer time it remains in a tortuous, slowly moving sluggish canal, and afterward is deposited in a reservoir where, when we are through with it, we can empty it from the body. If the power entering into this compartment be involved, there will be a leakage backward into the intestine. The same thing occurs with all of the sphincteric structures along the alimentary tube, and we will have regurgitation which means stasis, which means a lack of function, which means disease.

When we come to consider the question of relief from stasis we have to consider the whole line and Dr. Morris has referred to the sigmoid very properly, for no man can think of an operative relief for stasis without looking to the sigmoid. Some of these sigmoids are

long enough for patients to wipe their noses with if they had them out where they could do it. Others are short, and twisted upon themselves and bent. They may be in a tortuous condition brought about by adhesions the result of inflammatory reactions which do not reveal themselves at all in the histories of these cases. I have no doubt that hemorrhages occurring during the processes of ovulation produce blood clots and hematmata about the broad ligament, and are oftentimes in their absorptive processes the cause for the production of tortuosities and obstructions about the sigmoid in the presence of perfect tubal conditions. We know the very prevalent influence produced by the tubes in a pelvic organ. We have very commonly to consider the fact of anal fissure and rectal pathology in the production of constipation, in the production of retention in this reservoir of these excreta and the resultant dilatation from stasis. So beginning from the margin of the anus upward, considering next the rectum and sigmoid, we come back to the colon and to the head of the colon and arrive at the appendix and consider the pathological sequences about the appendix as the field in which we are going to get sole causations for this condition. This is, I believe, wrong. We must consider the entire field if we are going to get at the true status of affairs and do anything toward a cure of the cases.

I wish to speak again with reference to the ileocecal valve which has been overlooked in connection with a cure of this affection. I believe it is of decided importance to so do the operations as to retain the integrity of this structure, so that the food products, the excreta when once dumped into this reservoir, cannot get back again, as they will get back if you do an anastomosis between the colon and the ileum. There you will leave an open gateway, with a strong vigorous musculature on the one side opposed by a much weaker one on the other, and when the stronger acts it will regurgitate back upon the weaker, and there follows dilatation of the ileum such as you see in those cases of cecal stasis with an incompetent ileocecal valve. The operation then which preserves the integrity of the ileocecal valve will mean an operation which carries you below the ileocecal valve, or such an operation as will necessitate the transplantation of that ileocecal valve. And I do not believe any man lives who can make an ileocecal valve of the efficiency that we find already made for us. An operation then must contemplate the integrity and the preservation of the ileocecal valve above the chamber, the last reservoir, so that we are driving then below the ileocecal valve to the cecum. Some operation is going to be devised here of short circuiting character which will give relief. I am not going to say that the operation of ceco-sigmoidostomy is the operation of choice, but I am going to say that in my experience with it it has given relief, and when the anastomosis is made at the most dependent portion of the cecum and united low down at the lower end of the cecum by a very wide free opening, and a restitution of the ileocecal valve, which in many of these cases is found incompetent, by some means there follows the relief of symptoms, the recurrence of health, and the disappearance of evidences of disorder. I have

operated on several cases by this means, many of them having been operated for other conditions, the vast majority of them having had fibroid tumors removed, they were not producing symptoms, but these patients were suffering from symptoms of stasis. They underwent such operations as the removal of the tubes, appendectomy, gall-bladder operations, nephropexies and the like. The majority of cases I have done this operation upon have been so operated by others without relief, but they are now relieved of their symptoms. All of you have had expressions from your patients of gratitude relative to the relief they have had following certain operations, and I have with interest compared the percentage of such epistles I have received from patients relative to hysterectomies for fibroids, or appendicitis, or gall-stone operations, and the like, and I want to tell you the percentage is greatly in favor of the ceco-sigmoidostomy.

DR. JULIUS H. JACOBSON, Toledo.—There were a few points I wished to discuss before Dr. Noble spoke, and one of them, was the inadvisability of making the ileo-sigmoidostomy operation. Anastomoses between the small and large bowel have not been entirely satisfactory, such patients complain of pain and of the original symptoms continuing after the operation. As a general principle, regarding the anastomotic operations on the intestines, I think every one will agree that anastomoses performed between different parts of the colon, for instance, the ascending colon with the transverse, or the transverse to the descending, are usually followed by most excellent results. I mean, of course, in cases where there are strictures either from benign or malignant growths, above that part in which the operation is performed. These operations on the large bowel are very satisfactory and furnish us with a clue to operations which should be performed for cecal stasis.

Where we anastomose a mobile portion of the intestinal tract like the ileum to a fixed portion of the large intestine, namely, the sigmoid, painful peristalsis often continues and such patients are not relieved even though you do the operation as Lane has advised, and make an end to side anastomosis.

Rutherford Morrison of Newcastle has gone so far as to say that he is doubtful if it is ever necessary or advisable to do ileo-sigmoidostomy. He also states that if the operation is performed, a permanent enterostomy opening into the cecal side of the colon should be made to drain the colon above the anastomosis, the colon otherwise remains as a blind pouch giving trouble and continuing the stasis.

The only form of anastomosis between the large and small bowel which has been satisfactory is where the cecum and ascending colon and a portion of the ileum have been removed for malignant disease, and the ileum carried up and anastomosed into the ascending or transverse colon.

I think a great step forward was made when Eastman published his operation of ceco-sigmoidostomy. This operation permits an anastomosis between two portions of the large bowel, for the correction of stasis.

Eastman showed at the last meeting of the American Medical

Association in Atlantic City that his operation did not short circuit the intestinal contents but that the fecal current kept on going around in the natural way in spite of the fact that good results followed the operation. Eastman particularly emphasized the fact that drainage of the cecum and ascending colon is the all-important factor following the operation of ceco-sigmoidostomy and accounts for the good results.

At the Toledo meeting of this association I presented a paper on the chronicity of appendicitis. At that time I tried to emphasize a fact which has existed in our literature ever since the surgery of appendicitis began, namely, that from a pathologic standpoint we rarely see a case of acute appendicitis, that mostly all of our cases are chronic, and what we call acute appendicitis is in reality only an acute exacerbation of a chronic process.

I think all of you will agree that we very seldom see an appendix which does not present evidences of preexisting inflammation.

I do not consider it proven that we have hematogenous infection as a cause of appendicitis. The work of Cannon and others has shown reverse peristalsis in the ascending colon consequently we have normal stasis of intestinal contents in the cecum and wherever there is stasis, the bacterial count is high. Stasis in the cecum causes infection of the appendix, and that is the reason why we have appendicitis so frequently.

The operation which Dr. Marvel has described to-day is interesting and only emphasizes the work of Wilms in connection with cecum mobile.

I wish to speak of another important method of treating visceroposis. We all know, that such patients get relief when we put them in the Trendelenberg position and apply adhesive plaster after the method of Rosewater and Achilles Rose. By so doing you can give these patients symptomatic relief. The idea we have tried to carry out is to give these patients a permanent abdominal belt or support if for other reasons we are obliged to open the peritoneal cavity. We make a median incision, correcting all pathology which may be present in the pelvis, or whatever else we wish to do. The final steps of the operation being a plastic procedure which extends the incision out into a sort of Y on either side of the umbilicus. The anterior abdominal wall is shortened from side to side below the umbilicus and laterally or obliquely above the umbilicus, so that when we finish, the incision looks like the letter Y. The external oblique fascia is extensively overlapped.

In those cases where this operation has been made, we have found by x-ray examination afterward that the colon has been raised. I believe these abdominal plastics, where we increase the intra-abdominal pressure to get the organs into their proper position have a field of usefulness.

DR. DAVID HADDEN, Oakland, California.—I should like to present a suggestion, but without comment, that may be interesting in connection with the work of Dr. Morris. I wish to speak of some experimental work that Dr. Lemuel Adams has been doing on dogs,

but whether he has done it in the human being or not I do not know. After a lateral approximation he makes a circular incision about three-quarters around the bowel, down to the mucous membrane, separating the mucous membrane from the muscle wall above and below. He slides the proximal muscle layer underneath this distal muscle layer (indicating), leaving the mucous membrane untouched. Thus he has a valve, which goes right across the whole lumen of the intestine above the point of anastomosis, that offers good resistance to any tendency to upward flow, but no obstruction to passage in the normal direction.

Personally, I have not run across a case of stasis that I thought required anastomosis. My cases have been secondary either to appendix operations, two of them especially marked where the cecum was adherent to the abdominal wall for several inches, or were due to adventitious bands. Sometime I want to show *x*-ray pictures of one case of stasis following a Gilliam operation in which the round ligaments had pulled away from the broad ligaments, and not only the cecum but the sigmoid wandered around the cords, causing practically complete obstruction at times. Cutting the round ligaments has cleared up all of that trouble. The *x*-ray showed tremendous distention and elongation of the bowel that has already in the few months since operation practically disappeared.

DR. DAVID HADDEN, Oakland, California.—There are two questions I want to ask Dr. Bainbridge. First, whether he considers the general peritoneal colon infection as a secondary condition to the stasis or as the cause of the stasis? Second, personally in my small number of cases I have been impressed with the rather large proportion of positive complement fixation tests obtained, and I should like to know in what proportion of his cases there has been specific infection, and whether he considers syphilis as a frequent cause of adventitious bands in the abdomen?

DR. J. HENRY CARSTENS, Detroit.—It is not the colon alone that is the cause of the trouble in these cases. It is also the stomach, the liver, and more or less all the ligaments in the abdomen. After Dr. Jacobson has done the operation he has described, he puts on a belt and helps these patients along in that way. But that is not enough. One of my gastroenterological friends in Detroit has invented a belt to hold the organs up. It seems to me, all things considered, this condition is largely constitutional. It is brought about by the faulty carriage of girls which we see to-day. There is muscular weakness, and the trouble is not only physical, but mental. A great deal of this trouble is developed, is cultivated. Most of these patients are women. Why do not men have the same kind of trouble? If you take these women and train them from youth up as they should be they will not have some of these conditions. A girl comes along who is say twelve years of age. That girl is going to have the kind of trouble we have been describing. You can tell it from the manner in which she walks. We see another girl, and we can say positively that she is not going to have such trouble. If you take hold of a girl, twelve years of age, you can manage and control her, and if you can

do this, she is not likely to have this kind of abdominal trouble, this kind of relaxation. I have four girls in my family and we have not got that kind of trouble. I gave them a different kind of training. I believe in making tomboys out of girls. I make them exercise and work, and if you will do that with these patients and get hold of them early, you can by instituting proper physical exercise develop these abdominal muscles. By increasing the strength of these muscles by exercise, you likewise increase the strength of all the muscles in the body, as well as the ligaments and everything else, and you will bring about a condition that will cure these patients before they need any operative interference. I hope we will try to prevent this condition without requiring such operations as have been described.

DR. PANTZER (closing the discussion on his part).—Medical literature on this subject is becoming so voluminous that all have reason to condense their say. Perhaps, in an effort to condense, I have covered too much ground in my brief paper.

It depends upon the anatomical interrelation a loosely hung bowel has with the adjoining organs, whether in a given case this condition gives rise to trouble. I have found in a number of cases at operation that the transverse colon ascended directly from the cecum to the splenic flexure in individuals who had not suffered from stasis. Though nothing was done to correct this condition, the patients suffered no stasis while under observation afterward for years. It is not required to "hook up" the bowel at the hepatic juncture in such cases. The cecum is naturally a relatively mobile organ. It is in a measure like the adjoining part of the ileum. In the instance where the cecum is found grossly below a line drawn from the upper superior spine of the ileum to the umbilicus, or much higher than this line, or grossly contracted, distorted, thickened or impacted with feces, it is safe to assume the prevalence of stasis.

The extent to which pericolic membranes require division to reproduce the normal relations and condition is a surprise to him who has not attempted it. As a matter of fact this treatment of pericolic membranes is done by very few operators and then commonly done scimpingly and noneffectively. Where thoroughly done, a cecum which before operation was deformed and displaced, and which immediately after the division of the membranes reaches down to Poupart's ligament and fills the right half of the lower abdomen, within a few weeks may be found to be of normal size and position.

As to the effect obtained from short-circuiting of the bowel, I can see that its immediate effect may be most satisfactory. The stoppage of further toxemia with free catharsis has an effect I would liken to taking an individual who has been in a room full of smoke out into the open air. But the risk to life by the operation of short-circuiting, and the ultimate effect of permanently excluding the colon from the economy, seem to me ground sufficient for rejecting it, all the more because the resurrection of this function by the simple surgery, I employ, supported by remedies producing purgation through all eliminating organs, gives satisfactory results.

The relation of the kidney has been referred to in my paper. The retraction and shortening of the posterior cecal and colic wall occurs both in the direction from the cecum upward and from the hepatic flexure downward. Thus in these cases the kidney is found drawn downward, and by the anatomical relation the kidney holds to the duodenum, this organ suffers kinking. Both conditions, the floating or low kidney, and the duodenal angulation are relieved by the operation of free division of all pericecal and pericolic membranes. I hope that the operators doing the short-circuiting operation will early give us full reports on the ultimate effects it has upon the human economy.

DR. ROBERT T. MORRIS, New York City.—Dr. Marvel's idea will simplify operation very much indeed. It has been a little difficult to hold this bulging ballooned colon, and if I run a longer suture through, that is, two longitudinal sutures through the colon, it will be easier to put in the accordion stitch.

Dr. Bonifield asks if this is not going to stretch out subsequently. That is why I paint with iodine, and why I use the Pagenstecher linen thread. I believe those two resources will help particularly when we do not have semisolid contents going through the colon and causing it to become distended.

Dr. Noble and Dr. Carstens spoke truly when they referred to these cases as representing only one part of the whole trouble. We are speaking by synecdoche, and we have tried to do too much and have tried to concentrate our attention upon one organ after another and to relieve the patient of all her ills by doing this operation upon the colon, that one upon the kidney, and another one upon the ileum, when as a matter of fact, nearly all of these patients who are in trouble are in their peculiar condition because they should have had their ancestry short-circuited by one or two generations. (Laughter and applause.)

The trouble is a constitutional condition. The fashionable gait at the present time, the hyena slink is due to the fact that fashionable girls who are not obliged to work sometimes have a prolapse of their works. Neurasthenic rich girls are looked up to by the shop girls, consequently, the rich girl who is not obliged to work, and who has a prolapse of her works on that account, and develops the hyena slink because she cannot help it, is taken up as a model by the shop girls who think it is a fashionable pose. They acquire the pose largely by mimicry. These cases of fashion belong originally to the neurasthenic group of people.

DR. MARVEL (closing).—My paper deals with but one part of intestinal stasis, and that is with reference to cecal stasis. Not for one moment did it ever enter my mind that the responsibility for all intestinal stasis rest in the cecocolon. However, were a finger and toe both involved and you removed the toe, relief would probably be given the toe, but it could not be expected that relief from both the toe and finger would result, certainly the toe would require treatment. So it is with the cecum; you will not relieve other form of stasis by its correction, but the correction of its evil is directly indicated. I am

convinced that the responsibility of intestinal stasis rests more in the cecocolon pouch than any other part of the intestinal tract, and that this operation is desirable to give relief in view of the fact that it conserves all tissue, at the same time being a simple procedure.

I agree with Dr. Carstens and what Dr. Morris, has emphasized, that if the ancestors of the present generation had been educated by proper habits there would be fewer sufferers. I doubt that such instructions to the present generation will do much for those women who are past adult life, and have with them now these conditions. They need some help to give them more comfortable lives.

I expected to be harshly criticised, and I know I am in your minds, that I have not presented any x-ray evidence to show stasis before and none after operation. This is not always possible or expedient. The operator enters the abdomen oftentimes for some other indicated surgery and finds a ballooned colon as well. It matters little to the patient whether skiographed or not if this abnormality be present. The procedure is accomplished without the sacrifice of tissue or jeopardy of life and it conserves every function. I commend it to you and hope you will try it and report your experience as to the results.

LONGITUDINAL INVERSION OF THE COLON; A TECHNICAL STEP IN THE SHORT-CIRCUITING OPERATION.*

BY

ROBERT T. MORRIS, M. D.,

Professor of Surgery, New York Post-Graduate Medical School,
New York City.

(With two illustrations.)

At a time when we were making new progress with appendicitis, the tendency was to devote so much attention to detail that the patient was forgotten. Now, with our new colonic work, there is in some quarters a similar tendency to do work that is too severe. With this feeling in mind I have tried to develop the idea of simplifying the technic in selected cases in which a simplified method would be applicable.

The procedure was begun with redundant sigmoid cases in which we had to deal with this fairly common condition. After making anastomosis for short-circuiting, instead of cutting out superfluous sigmoid it seemed to me we might lessen the degree of traumatism by painting this bowel longitudinally with iodine, and then running a suture in such a way that when it was drawn it would bury the

* Read at the Annual Meeting of the American Association of Obstetricians and Gynecologists, Buffalo, September, 1914.

painted part longitudinally. This transformed the redundant part into a narrow "rope," and dependence was placed upon the iodine for causing strong adhesion. It may be done rather quickly and disposes of the redundant part with less traumatism than that belonging to excision methods.

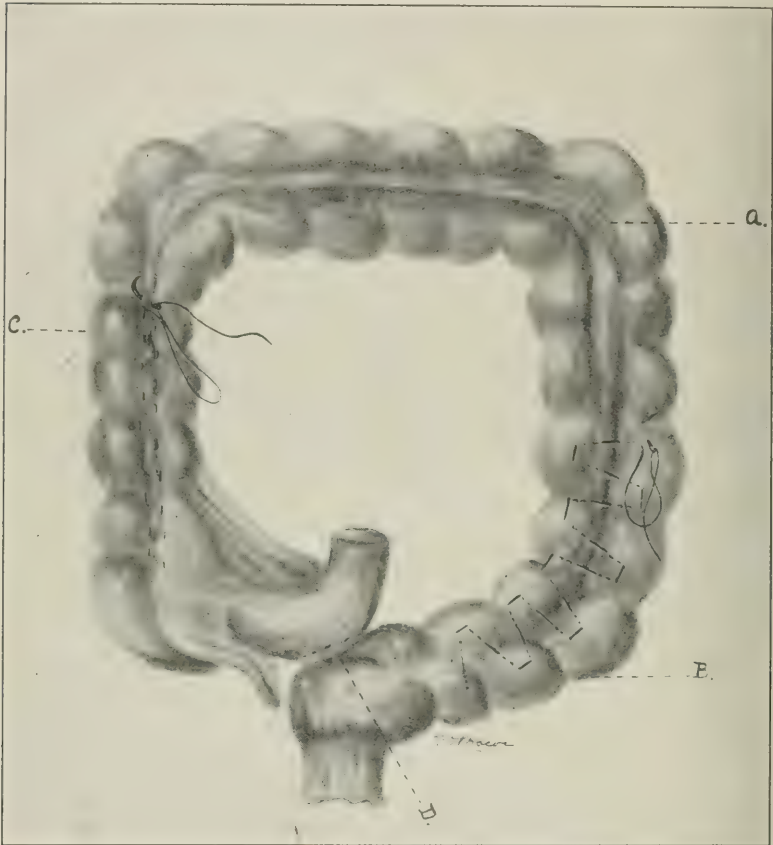


FIG. 1.—A. Central shaded part indicates area brushed with tincture of iodine for increasing adhesion of apposed peritoneal surfaces. B. Part of bowel showing first layer of mattress suture. C. Another part of bowel showing first layer of mattress suture closed. This would be followed by the "accordeon suture", depending upon the requirements in any given case. No two cases alike. D. Ileo-sigmoid anastomosis.

The first step was taken when we all tried to prevent reverse peristalsis after the ordinary short-circuit operation. At that time I angulated ileum distally from the point of anastomosis with the rectum, and angulated sigmoid proximally from the point

of anastomosis. After making the anastomosis, I had tried by means of such angulation to inhibit reverse peristalsis and succeeded fairly well in some cases. The next idea was that of plaiting the sigmoid, carrying out the principle of longitudinal inversion of 2 or 3 inches of the bowel above the point of anastomosis, for the purpose of stiffening and narrowing the bowel but allowing space enough so that the normal colon could force its fluid contents past this stiffened narrow part of the sigmoid. Fluid contents were little more than mucus, because the ileal angulation shunted the chief bowel contents into the anastomosis opening at the short-circuit site. This stiffening of part of the sigmoid seemed to be

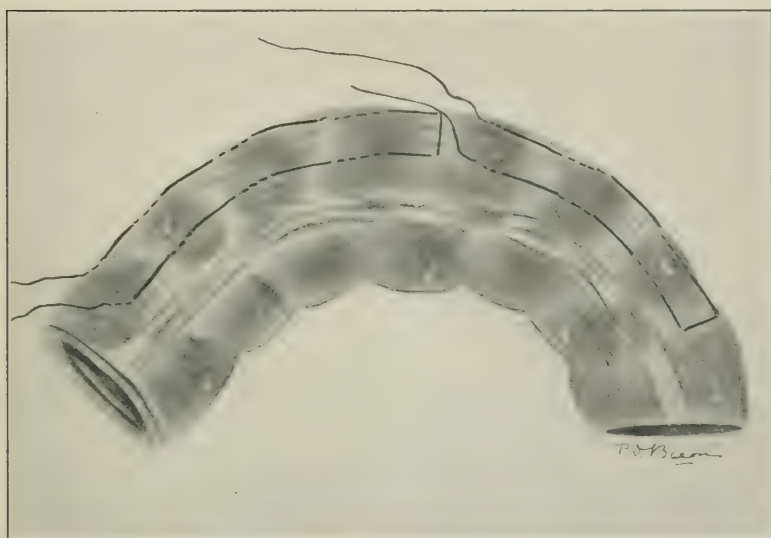


FIG. 2.—Accordion suture, for still further reducing the lumen of the colon, after introduction of one or more layers of mattress suture.

a fairly effective method. Then I continued the idea to apply to more or less of the colon, and in one case practically disposed of the entire colon above the point of anastomosis by longitudinal inversion of its wall. If you wish to dispose of most of the colon for the purpose of avoiding the operation of colectomy, in selected cases without too fat an omentum, introduce the suture at this point (indicating), make it in mattress form but carry it up a little obliquely, and then add what I call "the accordion stitch." Before the mattress suture is tightened we first dry the bowel, then paint it longitudinally with iodine, and rapidly introduce the linen stitch running the finger just

ahead of it to double in the bowel wall as we go. That not only causes longitudinal inversion of the bowel wall and disposes of most of the colon but it also shortens the colon. The accordion form of stitch may be made to shorten the colon still more, and disposes of most of the lumen, yet leaving room for the secretions of the colon to escape. Very little room is required for the passage of mucus and gas and we avoid in that way the adhesion complications and shock which follow colectomy in some cases.

Occasionally in cases of colectomy the shock is excessive, and the idea here by this new step, which is still in the experimental stage, is to do away with the severity of the operation of colectomy. In cases with large epiploic appendages these may be cut out at times, but in adipose patients they will interfere so that I presume the operation cannot be done. In cases with fat, heavy omentum, this structure will interfere because attachments of the omentum along the transverse colon are so high up on the colon wall that the anterior layer of omentum engages the line of suture, interfering with satisfactory longitudinal inversion of the colon. If the fat is not too thick we may sever the anterior layers of omental peritoneum, get a good grasp of the bowel in our suture and subsequently run a simple suture to carry back the cut layer of the omentum, to its place along the colon.

This work is still to be held *sub judice*. I have done the operation in only three cases and not completely in two of them. I developed this technic very recently and intended doing more before reporting, but on account of being absent from work during the summer, have not developed several points which will be taken up this winter in connection with the technic. The outline report is made at this time in order to allow some of the members of the Association to apply the principle in their practice.

616 MADISON AVENUE.

TRANSACTIONS OF THE NEW YORK OBSTETRICAL SOCIETY.

Meeting of October 13, 1914.

The President, DR. JOSEPH BRETTEAUER, in the Chair.

DR. EDWIN B. CRAGIN presented a case of

FULL-TERM ECTOPIC GESTATION WITH LIVING CHILD.

"It has fallen to my lot to operate upon five cases of ectopic gestation at term. In two of these the children were dead at the time of operation while in the remaining three the children were delivered alive and left the hospital in good condition. The five mothers all made good recoveries.

"The first three cases were presented to the American Gynecological Society in May, 1900. The fourth was presented to this society on November 13, 1900, and I have the privilege of presenting the fifth this evening:

"The mother, Mrs. C. L., was an ignorant negress who presented herself at the Sloane Hospital for Women on May 4, 1914. She thought her last menstruation was in August of the previous year, but the exact date she had forgotten. She remembered no irregular flowing and no attack of pain during the pregnancy. In fact one could obtain from her none of the symptoms usually associated with cases of advanced ectopic gestation. She supposed she was normally pregnant and having pain came to the hospital for her confinement.

"On examination the fetal head was found in the right iliac fossa and fetal movements were very distinctly felt through the abdominal wall. The cervix was long and admitted finger tip. Inability to make the head impinge upon the finger introduced into the cervical canal led me to suspect ectopic gestation and this suspicion was verified by passing the finger into the uterine cavity and finding it empty. She was operated upon May 6, 1914. A median incision disclosed the fact that the fetal sac was attached to the left tube and the posterior surface of the uterus, also that it was surrounded almost everywhere by adherent omentum and coils of intestine. After removal of the fetus careful examination of the sac showed that its chief blood supply could be ligated hence it was decided to remove the sac and placenta at once. This was done, the left tube being removed at the same time. In spite of a considerable raw area and false membrane stained with meconium the abdomen was closed without

drainage as was done in my previous case in which I secured primary union. In this case it proved to be a mistake and on the fifth day I was obliged to establish vaginal drainage on account of an accumulation of fluid and necrotic material in the pouch of Douglas. The patient had rather a stormy convalescence with more or less temperature for nearly a month. She finally left the hospital in good condition on July 1.

"The baby at birth weighed six pounds, seven ounces. One side of its face and head was considerably flattened from resting in the iliac fossa. The left foot was markedly turned in; the right foot turned out. At the end of a month the face and head had rounded out as seen in the accompanying photograph and now at the end of five months under orthopedic nonoperative treatment the legs and feet have become practically straight. On leaving the hospital the baby weighed seven pounds, ten and one-half ounces, and has gone on gaining steadily."



In three of the cases operated upon by me the sac was stitched to the abdominal wound and the placenta removed subsequently. In the last two cases the relations were such that the blood supply could be ligated and the sac and placenta removed at the time of the delivery, a result much to be desired, if careful examination of the fetal sac shows that its blood supply can be controlled by ligatures.

DR. ROBERT T. FRANK reported a case of

CHORIOEPITHELIOMA OF THE UTERUS.

Mrs. G. M., thirty-one years, one child four and one-half years ago. Nursed for eighteen months, amenorrhea persisted for a similar period (total amenorrhea three years). Since then period returned and was of regular four weekly type.

Three weeks before patient was seen by me she was two weeks overdue. Since then she has bled irregularly for a day or so each week. Aug. 21, 1913 when first examined, the patient was found in good general health, obese. The uterus was anteflexed, slightly enlarged and somewhat irregular.

On November 5 the patient was again seen. She had been transferred to a hospital because of two very severe hemorrhages occurring between the regular periods, which were normal in time and duration. She was very anemic (hemoglobin 40 per cent.), temperature normal, pulse 90 and small. On removing the uterine gauze, which had been inserted two days previously, and attempting to curet a little tissue for examination, immediate repacking had to be resorted to to control the profuse bleeding.

Two days later the patient was again seen in consultation with Dr. Brettauer. The material previously removed was completely necrotic, and showed no histological details. Her condition had changed for the worse. She had had two chills; her temperature was 104° , the pulse 150.

Dr. Brettauer removed the packing and curetted out considerable necrotic material. The hemorrhage proved alarming and uncontrollable. Therefore, in spite of the fever and poor general condition Dr. Brettauer advised hysterectomy.

I performed a typical vaginal hysterectomy at once, removing a flabby uterus, now three times the normal size. A saline infusion was given during the operation.

Convalescence was slow, but uneventful.

On December 30 the patient appeared at my office complaining of irregular spotting. The pelvic examination proved negative, except for a bright red granulating mass, the size of a cherry at the apex of the vagina. Specimens excised showed prolapse of a normal tube.

The prolapsed portion of the tube was completely excised without opening the peritoneal cavity. The patient has remained well one year.

The uterus was large, thick-walled, flabby. Its cavity was considerably dilated. In the region of the left horn was a necrotic area extending into the muscle. In the right horn several large submucous varices were located, one of which had ruptured. Microscopically the picture was that of atypical chorioepithelioma.

The patient, after a period of three years' amenorrhea, probably conceived and aborted. From this abortion resulted the chorioepithelioma. The main interest arises from the fact that the copious hemorrhages appear to have occurred not from the new growth, but from a ruptured uterine varix.

DR. GEO. W. KOSMAK presented a report on a case of

CARCINOMA OF THE OVARY ASSOCIATED WITH EARLY PREGNANCY.

In the case herewith reported a doubt in the diagnosis led to the performance of an exploratory laparotomy in which the unexpected findings have led to a further study of the same.

The patient, Mrs. A. B., was admitted to the Lying-In Hospital on August 18, 1914 (service of Dr. A. B. Davis). She was thirty-five years of age, a para-x, with previous normal labors and no miscarriages. Her first labor occurred in 1900 and the last in 1913. She stated that she menstruated in April, 1914. Her previous history was normal and both she and her husband were apparently healthy. She stated that subsequent to her cessation of menstruation she believed herself pregnant but observed nothing abnormal until a few weeks before admission to the hospital, when she began to bleed slightly and complained of pain in the lower abdomen, which was more marked on the left side.

An examination made at the time of admission showed a well-developed healthy looking woman in good general physical condition. Vaginal examination disclosed an enlarged uterus with a tender mass on the left side of the same. There was slight bright bloody discharge present. The bimanual examination was rendered somewhat difficult by the presence of a thick abdominal wall. The patient was referred to the hospital for observation in the belief that a possible ectopic pregnancy on the left side was present. The moderate cramp-like pain continued as well as the discharge and in view of the woman's social condition, large family depending on her care, etc., it was thought advisable to do an exploratory operation with the removal of the left adnexa. The abdominal cavity was entered through a Battle incision on the left side. Exploration showed the uterus enlarged to the size of a two and one-half months pregnancy, freely movable, no adhesions present. The left ovary was as large as a hen's egg, appeared very dense and showed on its surface a yellow corpus luteum. The tube was thickened but otherwise normal. The ovary was incised over the free surface and the interior found to be made up of firm tissue with small cysts scattered through the same and a clot of moderate size in the substance of the organ near the hilum. The other ovary and tube were perfectly normal. In view of the pain and tenderness elicited from this ovary, it was thought advisable to remove the same for further examination. The base was ligatured with plain catgut, the organ removed and the raw surface whipped over with a continuous suture. Exploration also showed the lower pole of the left kidney on a level with the brim of the pelvis, which probably accounted for some of the tenderness complained of in this region. There were no enlarged pelvic glands present. Four days after operation the patient again began to bleed and developed severe cramp-like expulsive pains, which finally resulted in the extrusion of the small fetus with its bag of membranes.

Dressing of the abdominal wound on the fifth day showed primary union. The patient was in the hospital for twenty-five days after operation, having made an uninterrupted recovery. The highest temperature was 100° F. on the first day.

The histological examination of the specimen disclosed, much to my surprise, the fact that we were dealing here with carcinoma of the ovary. The histological description of the specimen made by Dr. Losee, the hospital pathologist, is as follows: Ovary (left), the speci-

men is ovoid, its surface is regular and smooth and it measures 4.5 cm. in its greatest diameter. Section shows that it is divided into two separate and distinct portions. About one-third is made up almost entirely of a corpus luteum. The other portion contains a soft, white tissue in the center of which there is blood clot. Microscopical examination of sections through the latter portion shows that it is made up entirely of numerous small cells of epithelial origin. These cells are in masses of various sizes and shapes and separated by a small amount of fibrous tissue stroma. They are small, do not contain much chromatin and mitosis is not observed. In certain areas they appear to have an adenomatous arrangement. Examination of the other portion of the ovary shows numerous lutein cells arranged about a cystic cavity.

Diagnosis.—Carcinoma of the ovary.

The occurrence of carcinoma of the ovary as a metastatic deposit is not unusual and has been accepted as a common occurrence. The gastrointestinal tract in such cases has usually been found to present the primary growth and the metastatic deposits ordinarily are found in both ovaries. Primary ovarian carcinoma, on the other hand, is very much rarer and its existence has been denied by many authors. In a series of 100 cases of ovarian tumor observed by Massabuau and Etienne (*Revue de Gyn. et Chir. Abdom.*, 1913, No. 3) pregnancy was associated with such growths in three instances. Two predominant forms were present, the solid cancer and the cystic epithelioma. The same authors in stating that the diagnosis can only be made after operation, advise the radical removal of both ovaries whether microscopically diseased or not, and likewise the uterus. Carcinomatous tumors following degeneration of papillary cyst adenoma have also been described by a number of authors. In several instances of the latter, carcinomatous recurrences were noted as long as eight years after the removal of the primary growth. Braun (*Monatschr. f. Geb. u. Gynäk.*, vol. xxxix, No. 1, ref.) reports a case in which double cystic ovaries in a woman of forty-eight were found to be carcinomatous and eleven months later the uterus required removal for malignancy.

In the case herewith reported no possibility of the occurrence of a malignant tumor was considered and it was only for the, in this case, fortunate error in diagnosis that the true condition was accidentally discovered. In view of the lack of enlarged pelvic glands or other evidences of pelvic disease, it is possible that in this case, the patient may remain free from recurrence. I expect to present a more complete report of this case later.

DR. W. H. W. KNIPE read a paper entitled

THE FREIBURG METHOD OF DÄMMERSCHLAF OR TWILIGHT SLEEP.*

DISCUSSION.

DR. JOHN O. POLAK.—After listening to this exhaustive paper I find that there is nothing to add to the technic or the other details.

* For original article see page 884.

Anything we can offer, therefore, in the discussion will simply be our limited contribution to the clinical phase of the method. If we accept the statistics quoted, there can be no question that "twilight sleep" can be produced in 90 per cent. of the cases, but we cannot produce absolute forgetfulness of the labor process in such a large percentage.

A reason, perhaps, why twilight sleep is needed, at least in Brooklyn, is because we have found that the women demand it and we have simply attempted to supply the demand. Probably this may also be the case in New York. The question that comes before us and is a most important one to decide, is, if we can produce painless labor in 90 per cent. of parturient women, is it safe to do so?

What Dr. Knipe has stated in regard to dosage coincides absolutely with our experience. When I came back from Freiburg and used the schedule of dosage employed there on the second and third class patients in the clinic, we had the same results from too much morphine causing asphyxia of the babies, some showing cyanosis and others delay in respiration. We used the method continuously since August 15, and in the series in which we have done so, there have been no stillbirths. We have had three babies born cyanotic and three who had to be resuscitated. The others cried lustily on delivery. In two babies of private patients who did not cry immediately, too much narcophin had been used, in order to produce analgesia in these particular patients. The babies, however, were easily resuscitated. There was no effect upon the mothers. The mothers who undergo this treatment are more than satisfied with the labor when they awake out of the twilight sleep about half an hour or an hour afterward and find their babies born. We have repaired perineal tears immediately and we have used forceps without the use of chloroform and the woman has had no recollection of the procedure. We watch the fetal heart every fifteen or thirty minutes and with a number of students in the service it is easy to do that. We are convinced that a large number of deliveries are actually shortened, that is, dilatation of the cervix occurs earlier than in ordinary deliveries. If there is no other reason for the use of this method, than that it secures early dilatation of the cervix, it deserves consideration.

In regard to the third stage of labor, we have had no hemorrhages in any of our cases. The second stage, however, when narcophin or morphine was repeated, was prolonged. When the head gets on the perineum it stays there. We have found that by placing the patient in the Schmidt position and using 'expressio fetus' we did not have to use forceps. We believe pituitrin to be dangerous to the child at this time for, by the use of this drug after a long second stage, when the uterus is molded on the child after a great part of the child has passed through the cervix, pituitrin may cause separation of the placenta or asphyxia of the child and we have had to use forceps in order to bring the child out alive. We have had nearly 100 cases in Brooklyn.

DR. E. B. CRAGIN.—I am only a pupil in this school of twilight, but the more I study in it, the more I find I have to learn, and the

same may apply to some of you. I have been very much impressed with the honesty of Profs. Krönig and Gauss and of Dr. Schloessingk who may be regarded as the representative of their method. Dr. Schloessingk has been perfectly willing to acknowledge his failures and to tell us the truth when we asked him if the method in an individual case he considered a success or not. In our experiments at the Sloane Hospital we have been favored in having Dr. Schloessingk as our teacher. I freely confess we have had about all the bad results one is likely to have in a long series of cases. I do not think it reflects much upon the method, as we are only beginners. We have learned some things to avoid. There are a number of disadvantages about this method as well as advantages. The advantages have all been reported here to-night, and you will pardon me for presenting some of the disadvantages. Those of you who are engaged in obstetrics know that a great many cases here in New York suffer from primary inertia and all who use twilight sleep admit that it is contra-indicated in primary inertia.

It is difficult to tell when a woman in twilight sleep passes from the first to the second stage and in order to avoid leaving a woman too long in the second stage more vaginal examinations are necessary than in our usual methods. This increase in the number of vaginal examinations means an increase in the danger of infection.

Again the large number of hypodermatic injections needed means more or less risk of abscesses from this source.

Twilight sleep prolongs the second stage of labor. In one of our cases the patient was left too long in the second stage from failure to recognize the transition from the first to the second stage and the long pressure on the pelvic floor, coupled perhaps with the poison of the drugs, resulted in a stillbirth. This child should have been delivered with the forceps an hour earlier.

To practise the twilight sleep method, one must not only be a skilled obstetrician but must be skilled in the use of the drugs employed. We have to admit that the method has great possibilities and I am inclined to think that even if we do not use the complete method or use it as a routine measure, we may use it in part, in combination with our other methods. It certainly makes the first stage easier and allows a woman to dilate her cervix with less discomfort, hence I feel that perhaps in dilating a long rigid cervix we may use the drugs as an adjuvant to our other methods. I am trying to learn how much good there is in it and how far we can use it. At present I am not willing to use it in private practice.

DR. R. L. DICKINSON.—My experience has been that of most of us concerning the three methods of "twilight sleep." When the idea was first published we gave morphine too often or too near the delivery and risked the baby's life. I lost one baby, possibly from this cause. These notes in my hand are full records of the two visits of the American Gynecological Club to Freiburg. Two years ago the practice here recorded differed from that we saw on our last visit. As to the third method the statement is frankly made by Gauss that it is still on trial. The Freiburg cases are reported as though only

one method had obtained. In private practice ("first class") they use morphine and the older method. It is narcophin that is still on trial. The stable scopolamin "Roche" is their main newer achievement.

I want to voice my hearty admiration of the energy and ability of Professor Krönig. He has made enemies who cast doubt on his figures. It is our duty to study these with care and to put them to proof. The most important detail to work out practically is watching the patients. Sister Marie Louise is a very able woman and she has been engaged upon this work for years. Her astuteness has a great deal to do with the good results. At Freiburg they watch the fetal heart incessantly. We could put students at this work. We can perhaps train nurses sufficiently well. If this were done and we had younger men or skilled nurses at the bedside could we use the method in private practice? Without some well-trained substitute to undertake such watchfulness in every labor the doctor would have to be present himself throughout. At present such watching can only be done in a hospital or else its cost is prohibitive. Dr. Polak has suggested that we should train some of the younger anesthetists to control our narcophin and scopolamin in labors in private houses otherwise *dämmerschlaf* cannot be undertaken by busy men.

DR. R. M. BEACH.—We have used the twilight method in the Brooklyn Jewish Maternity Hospital since the middle of August and the keynote to the success of the procedure is "individualization." Not in any case can we follow a definite schedule. I have had better results with my private than with ward patients, because I have personally watched them more closely. By this method we can carry a woman through labor without being compelled to interfere before full dilatation of the cervix, which is impossible otherwise in the presence of a nervous family or relatives. I have been especially surprised in nearly all cases that almost no laceration takes place. The main disadvantage seems to be the difficulty in primiparæ caused by the prolongation of the second stage. I use the simple procedure of a tight binder, flexing of the thighs upon the abdomen and also using pituitrin. I have had no bad results from the latter, but do not use it unless the head is in sight. These patients may also be made to bear down with the pains and have no recollection of it afterward.

In the Jewish Hospital in Brooklyn we had a toxic case a few days ago to whom we gave numerous colonic irrigations and the patient had no recollection of them afterward. There are two other points.

I make it a point of being constantly with these women and talking to them while they are going into the twilight state analogous to an ordinary anesthesia. I find that my private patients thus attended do not make any noise and lie perfectly still, and these people have no mental excitation. The cases that have gone through the twilight behave much more quietly and make less disturbance than others. The higher the type of intellect, the better the twilight succeeds.

There is also a social side of the question. The only people to-day who understand prevention of conception, are the better and middle classes who object to having more than two babies owing to the

pains they have to undergo. We shall, therefore, have a better race of people with the application of the twilight method, because these women will have more babies if they know they can have them without pain.

DR. KNIPE in closing the discussion said: The method of using scopolamin was developed by Gauss, and as it requires from one and one-half to two hours for its induction, the method is essentially a first stage of labor aid; whether the first stage of labor is thereby shortened is doubtful, but there can be no doubt that it is very much more comfortable for the patient. My own experience with pituitary extract leads me to use the pituitrin with great caution. We have heard a great deal concerning the advantage of narcophin over morphinmuriate, but the originator of the method, Gauss, and the nurse, Sister Mary Louise, who has been at the bedside during the development of the method, both prefer morphine and use it with their private cases; whereas the narcophin is simply being tested upon the fourth class patients and does not give as good results as morphine when the latter is properly used.

In regard to the restlessness in my cases being high, this is because of the small series and the accidental inclusion of some very hysterical patients, in fact one of our restless cases was almost as restless one week before confinement when she only thought she was in labor and when no drug was given. That the restlessness is due to the use of my own solution cannot be considered, for my solution was prepared according to the directions of Prof. Straub and is identical with the commercial preparation used by others.

The greater the intelligence of the patient and the less fear or anxiety excited in the patient, the easier is it to induce twilight sleep. While absolute quiet or darkness is not essential to twilight sleep, it requires very much less drug to induce the condition when the environment is proper; and the less drug used the less chance is there for the advent of unfortunate complications.

It is a fact that there is frequently a prolongation of the second stage and therefore its management requires considerable obstetric knowledge, as interference may be necessary at any time; it is for this reason that an anesthetist will not be able to carry on the twilight sleep unless he is also an obstetrician; but if he is the latter, he would not act as an anesthetist. It will become necessary for us to train especially intelligent nurses in the twilight method and to teach them the obstetrical necessities during twilight; this is the method pursued at Freiburg. The risks of infection due to vaginal examinations may be prevented by making rectal examinations, by which all necessary information may be obtained.

TRANSACTIONS OF THE ALUMNI OF THE SLOANE HOSPITAL FOR WOMEN.

Stated Meeting held October 23, 1914.

The President, GEO. W. KOSMAK, M. D., in the Chair.

DR. FRANK R. OASTLER presented specimens of

OVARIAN CYSTS OF DOUBTFUL MALIGNANCY.

These were removed from a woman fifty-one years of age who presented no symptoms until three months before operation when a period of amenorrhea began. Two months previously a tumor was felt and the patient became constipated, when a diagnosis of ovarian cyst was made and at the time of operation a second one, almost as large, was discovered. These were removed without difficulty. Tapping was first tried but failed. After the cysts were removed an examination of the abdominal cavity showed a metastatic deposit in the rectum and the cecum was likewise invaded with portions of a cyst projecting from its wall. There were small cysts of the parietal peritoneum. Several portions of the first two cysts were examined and a pathological diagnosis of simple ovarian cyst made. The pathologist was then asked how he accounted for the secondary cysts and his answer was that, as a matter of fact, it was as yet impossible to define the term malignancy. Upon being asked whether these cysts were malignant, the reply was that from the history of the case, they must be judged so.

The interesting feature from a pathological point of view is what constitutes malignancy. Do metastases spring by direct contact of the cyst with the neighboring organs or do they spread through the lymph and blood channels, or is it possible that there is a transudation of some fluid carrying along with it some of the cells of the cyst wall? It is probable that dissemination by the lymph and blood-vessels occurs and that this does not take place by contact or transudate. If this is true, ovarian cysts may be treated as in the past by tapping them, and no harm results from the escape of the fluid during this process. If, on the other hand, the metastatic growths are secondary to the original cysts either by contact or by direct cell implantation, then the procedure of tapping is altogether wrong. As a differential diagnosis cannot be made, Dr. Oastler believed that we would have to remove all cysts *in toto* and even an apparently simple cyst must not be tapped because it is uncertain whether malignancy is present or not.

DR. C. A. McWILLIAMS asked whether there was a papillary growth inside the sac, because it looked like a papillary cystic adenoma, to which Dr. Oastler replied that there was not and that there was no evidence or anything pointing to a papillary growth. Dr. McWilliams, continuing, remembered Charles Mayo saying that a cyst should always be removed intact without tapping, so as to avoid the danger of spilling the fluid within the peritoneal cavity, never being sure whether the inside of the cyst did not contain adenomatous masses, cells from which in the peritoneal cavity would produce implantation tumors. It seemed a good rule to follow, even though it might mean an incision the length of the abdomen.

DR. E. A. GALLANT, in 1908, presented a case of colloid sarcoma of the femur after disarticulation at the hip-joint, at which time the pelvis and abdomen were perfectly normal. Six months after operation there had developed an abdominal tumor reaching to the umbilicus, which proved to be a colloid cyst of the broad ligament on the *opposite* side. During the enucleation from the broad ligament the thin-walled cyst ruptured, some colloid material escaped into the peritoneal cavity; which rapidly filled up and death occurred about seven weeks later. Dr. Gallant has wondered if the left-sided cyst was merely a coincident, or a metastasis from the thigh, and how, otherwise, could it have reached that side?

Hart and Barbour claim that malignant parovarian cysts originate from the remnants of the Wolffian bodies, and that outside of these "remnants" only benign cysts arise.

In view of the fact, as stated by Dr. Oastler, that before examining the interior of broad ligament cysts there is no way of determining their benign or malignant nature, it must be advisable to deliver these cysts *in toto*, as the only means of avoiding peritoneal infection.

DR. E. T. HULL read a paper on

EXPERIMENTS ON THE ETIOLOGY OF ECLAMPSIA.*

DISCUSSION.

DR. E. B. CRAGIN said that to the man who could throw light on the etiology of eclampsia we should owe a debt of everlasting gratitude. The experiments of Dr. Hull had been exceedingly illuminating. Those who had watched cases of anaphylactic shock and also of eclampsia could not have failed to notice a certain resemblance between the two, but it seemed that there was always a cloud between us and a clear knowledge of the subject which could not be penetrated. It looked from to-night's paper as if Dr. Hull had made a rent in that cloud, and although one would have to study his paper in the quiet of his office as it could not be followed here in detail, we must be very grateful to Dr. Hull for having presented it, feeling certain that he was working on the right lines.

DR. HULL, in closing, said that some of these reactions were very complicated and he did not claim to have said the last word so far as

* For original article see page 919.

the origin of eclampsia was concerned. He had simply presented the results of the experiments that had been carried out. The possibility of tracing the source of Abderhalden's protective ferment of pregnancy had been of particular interest to him. They had found that, by injecting fetal protein into male animals they were able to get a positive test of pregnancy. Repeating the experiment and injecting the same proteid with the ferment killed, the same test was negative. This would suggest that possibly the Abderhalden ferment may be elaborated by the breaking down of the fetal cells with the liberation of their intracellular enzymes.

DR. W. H. WELLINGTON KNIPE read a paper on

THE FREIBURG METHOD OF DÄMMERSCHLAF OR TWILIGHT SLEEP.*

DISCUSSION.

DR. E. B. CRAGIN said that the practice of twilight sleep was not as easy a matter as represented in the lay magazines. If any body thought that the practice of the method was possible by the general practitioner with small experience, this is a mistake. Dr. Cragin said that they desired to try it at the Sloane Hospital and invited Dr. Schloessingk, who had been for four years on the staff of Professors Krönig and Gauss, to demonstrate the method. Dr. Cragin admitted that there were possibilities of good in the method, but he found certain disadvantages which he desired to refer to. He stated that primary inertia of the uterus is commonly observed in New York. Everybody who has used the twilight sleep procedure admitted that in primary inertia the method was contraindicated. Siegel advises that the drugs be administered when the pains are about ten minutes apart. Gauss and his representative here do not begin the procedure until the pains are strong and five minutes apart. As to the effect on the patient, Dr. Cragin found that some were markedly excited and tried to get out of bed, which makes it difficult to keep the sterile drapery in place and interferes with aseptic methods. Another disadvantage of the method consists in the fact that until considerable experience is obtained it is very difficult to tell when the woman passes from the first to the second stage of labor, as the signs upon which reliance is usually placed, are obscured. This means that in order to avoid keeping the woman too long in the second stage, more examinations have to be made than is customary and this increases the risk of infection. At the Sloane Hospital, although the case was in charge of Dr. Schloessingk, one stillbirth resulted, which might have been due to three possibilities. In the first place the woman was in the second stage and the head was on the perineum longer than usual and a forceps delivery an hour earlier would probably have saved the baby. The second possibility was that the baby was killed by the repeated doses of scopolamin. The third possibility was that the child was killed by pituitrin, of which

* For original article see page 884.

there were two doses of 1 c.c., each given when the second stage was prolonged. This employment of pituitrin to stimulate the pains lulled by scopolamin is the method employed at Freiburg and Dr. Cragin thought that its safety was open to question. Another case which illustrated the disadvantages of the method was that of a frankbreech, which on account of the uncertainty of the transition from the first to the second stage was left too long in the latter before the wedge was broken up by pulling down a foot and although the baby was born alive it died later as the result of delivery. The method undoubtedly prolongs the second stage and the speaker believed that a good many cases in this country would have to be subjected to forceps, which without twilight sleep would not have required it. This occurs from the fact that the women cannot make use of their abdominal muscles and would not, therefore, aid in the delivery as they ordinarily do. On the other hand, the method has advantages, for the first stage of labor under ordinary circumstances is a great annoyance to most women and twilight sleep makes this first stage much more comfortable. Even if the method is not employed as a routine measure it is perfectly possible that it can be used during the first stage to give relief from that trying period and then the second stage might be conducted in the ordinary way. Dr. Cragin thought twilight sleep was not a method for the general practitioner as it required not only obstetric skill but experience in the use of the drugs employed.

DR. C. E. LIEB said that scopolamin is a levorotatory alkaloid which was first isolated from *Scopola atropoides*. It occurs in various *Solanaceæ* and has been obtained from *Hyoscyamus niger*, *Duboisia myropoides*, and, in small amounts, from *Atropa belladonna*. The U. S. P., VIII, does not specify from which of these *Solanaceæ* the alkaloid should be obtained.

Another name for scopolamin is hyoscine, which was first found in *Hyoscyamus niger*. The identity of the two alkaloids, scopolamin and hyoscine, is admitted by the U. S. P., VIII, and the German Pharmacopœia has dropped the name "hyoscine" and substituted for it the word "scopolamin."

Chemically scopolamin resembles atropine, and, like the latter, scopolamin dilates the pupil, paralyzes accommodation, inhibits secretion, paralyzes the endings of the cardiac vagus, etc. Its action on the central nervous system, however, differs from that of atropine in that it produces a primary depression of certain areas of the cerebrum, and hence has been employed as a sedative and hypnotic. Another important difference between the actions of these two drugs is the effect on the respiratory center. Atropine stimulates this center: scopolamin depresses it.

As far as laboratory evidence goes, scopolamin has no narcotic effect on rabbits. Dogs, however, show a well-marked depression. Before going to sleep they usually show some restlessness, almost excitement. It has been suggested that this is due to hallucinations. Later, the gait becomes awkward and there is a well-marked weakness of the posterior extremities. As the effect becomes more pro-

nounced, the dogs stagger about as if drunk; then they become quieter, and finally fall asleep.

Although it is true that even the most violently excited individuals are usually quieted by scopolamin, there is a marked difference between the mechanism of the sleep produced by scopolamin and that following the true hypnotics. The latter tend to induce sleep by depressing those areas which are especially concerned with the perception of sensory impulses. Under the ordinary narcotic, therefore, the patient goes to sleep because he is cut off from disturbing outside influences. Scopolamin, on the other hand, does not seem to affect perception markedly. It is for this reason that during the induction of "twilight sleep" the patient is placed in a quiet, darkened room, is made to wear smoked glasses, and has her ears blocked with cotton. The essential action of scopolamine is a depression of the motor areas of the cerebellum. Thus, the first symptoms after an injection are motor weariness and muscular relaxation. The patient becomes quiet and relaxed. The breathing is frequently stertorous from relaxation of the epiglottis; speech is indistinct; the mouth is dry; pupils dilated and inactive. At this stage the patient is quite conscious and can interpret afferent impulses. Finally, sleep develops, not infrequently preceded by hallucinations or excitement.

There seems to be considerable variation in the response of the individual to scopolamin. This may be due either to an idiosyncrasy on the part of the patient or to the presence of a contaminating alkaloid, apo-atropine. This contamination is not more likely to occur in scopolamin than in hyoscine.

The excretion of the drug occurs chiefly in the urine, though some may be found in the milk for two or three days after injection.

There are a number of dangers connected with the use of scopolamin which must be borne in mind. First, to consider the dangers to the mother. There are the individual idiosyncrasies, so that the patient responds by excitement instead of depression. There is also a distinct danger of cardiac failure and death. Respiratory depression may be so excessive as to prove dangerous.

The dangers to the baby are concerned chiefly with the effect on respiration. Scopolamin is transmitted from the maternal to the fetal circulation, and this accounts for the large number of apneic babies that are born after "twilight sleep." The other danger to the baby is due to the excretion of the scopolamine in the mother's milk, so that for two or three days after birth the baby receives small doses of scopolamin.

In describing morphine, Dr. Lieb said that moderate doses of morphine, such as are given for the induction of "twilight sleep," cause chiefly a depression of the ability to perceive pain. There is practically no interference with cerebration and no marked desire to go to sleep. The depression of pain perception is due to a central action and not to the paralysis of nerve endings for pain.

Besides this, however, another important effect of morphine is depression of the respiratory center. With this danger you are familiar. The spinal cord is certainly not depressed by the small

doses of morphine which are recommended, so that there is probably no interference with the expulsive force of the uterine contractions. The isolated uterus is stimulated by small doses of morphine. As far as we have been able to determine, scopolamin has no effect on such a uterus. Whether scopolamin enhances this morphine action is not known.

A considerable proportion of the morphine injected is destroyed in the body. A small amount is excreted in the milk.

The dangers to the mother are chiefly the possibility of depressing the respiratory center. Just as some patients show an idiosyncrasy to scopolamin, so a certain percentage react to morphine not by depression but by delirium.

As far as the child is concerned, morphine, like scopolamin, is passed over into the fetal circulation, and thus reinforces the depression of the respiratory center caused by the scopolamin. Morphine is also excreted in the milk, so that the baby is fed for two or three days on the morphine-scopolamin mixture.

Narcophin is a combination of narcotine and morphine-meconate. Meconic acid is an organic acid which is specific to opium, and in narcophin combines with narcotine and morphine to form salts. There is no special advantage in the meconate over the sulphate or hydrochloride.

Narcotine acts like morphine, though it has a powerful stimulating action on the spinal cord.

Dr. Lieb believed that the dangers of morphine-scopolamin have been sufficiently emphasized. We are all of us familiar with the action of hyoscine. We all of us dread to employ this dangerous hypnotic. Changing the name of hyoscine to scopolamin in no particular modifies the poisonous properties of the alkaloid.

DR. G. L. BRODHEAD said that his experience with this treatment was limited to a few cases at the Post-Graduate and twenty at the Harlem Hospital and that it is impossible to draw conclusions from such a small number. The method of Siegel was used, scopolamin and narcophin being given at stated intervals and the results in the main have been satisfactory. Sixteen of the twenty women had amnesia so far as the confinement was concerned as they remembered very little or nothing about it. There were two little rooms for these patients and when the time for delivery approaches they are taken across the hall to the delivery room. They remember so little about it that they often ask when the baby is going to be born when, as a matter of fact, it had been born several hours ago. The results were very satisfactory so far as the mothers were concerned, as the method makes labor very much easier.

Another point to be considered in these cases is the amount of blood lost and in these twenty cases there has been only the usual amount of hemorrhage. With regard to excitement, several patients would have jumped out of bed if the nurses had not been there to restrain them and two or three of them had mild excitement. The average number of doses was five.

With reference to the use of forceps, the low forceps operation was

performed in two of the cases and the extraction was very easy. Two patients were given 1 c.c. of pituitrin with excellent results. Thus in twenty cases, two had pituitrin, two required forceps, four had a small amount of chloroform or ethyl chloride. In two or three cases hot and cold water and artificial respiration had to be resorted to but all of the babies cried very soon and left the hospital in good condition.

DR. O. P. HUMPHSTONE stated that as a student of the "twilight" method, he had had enough experience to wish to take back what he once said condemning this method. It has its uses and its limitations. They had about 100 cases in Brooklyn and he had personally observed nineteen cases through labor. Anyone who has ever done so will know what this means. It is said that a guard standing watch over the dead body of a king cannot stand it for more than half an hour, so arduous is the duty of watching. No one will be able to watch a sufficient number of twilight cases outside of a hospital to make a living without killing himself. This at once shows the impracticability of using the twilight method by the general practitioner and the midwife who do the most of the obstetrics in this country. It will never be generally used outside of a hospital, except possibly by the wealthy.

The chief advantage is the lack of nervous shock, the shortening of the first stage; the cervix dilating more readily particularly in dry labor. Then these patients look differently; better the morning after labor than patients who have not had the "twilight."

The present secret of success lies in the stable solution of scopolamin of Prof. Straub. Dr. Humpstone used hyoscine, and each time it was used there was delirium. Women were boisterous and wild and even got out of bed when the nurse was not looking.

That memory of pain can be obliterated is a fact, but that the method is a panacea for painful childbirth is a fallacy. It can only be used by trained men who can give the necessary time to the case. The very wealthy can pay for it and the poor will receive it in hospitals.

As a working basis of his applications, he employed the Siegel dosage, with modifications. The tendency is to give too much, with the idea to make patients sleep soundly; and when they do, it looks beautiful; but is not the purpose at all. They should sleep between the pains. In our cases it has frequently happened that when the nurse was not watching the perineum the head came down unexpectedly and even precipitate labor occurred without any manifest disturbance on the woman's part.

Dr. Humpstone wanted to add his testimony to the fact that pituitrin is to be condemned where "twilight" is used. He gave pituitrin to a woman in a prolonged second stage and, listening to the fetal heart, found it had dropped from 150 to 60, with the head on the perineum. He pulled the baby out with forceps in a state of pallid asphyxia and it took seventeen to eighteen minutes to resuscitate it.

The speaker closed by giving a detailed summary of nineteen cases.

DR. L. E. LA FETRA said that although he had no personal experience with the method, it seemed quite evident from the statements of several speakers that the procedure was never devised for the sake of the babies. All these drugs have a severe and depressing effect on the infant's nervous system and prolong the second stage of labor beyond the period usually allowed at the Sloane Hospital, which is a very serious thing. The reports from Freiburg that they have had a large number of asphyxiated babies, is warning that no one should undertake the treatment unless he is an experienced obstetrician and can be present on the case all the time. Aside from drug depression there is danger of hemorrhage, the effect of which may be disclosed in the baby later on. Dr. La Fetra was desirous of hearing more about the further progress of these babies after three or four years, because it is very well known that many infants develop epileptic attacks in early childhood who were born after a long and dry labor. Therefore, if the second stage is going to last for two or three or more hours it is a very serious danger.

Dr. OASTLER said that we had just heard from Dr. Lieb that the chemist found no difference between scopolamine hydrobromate and hyosine hydrobromate. If this were so it would seem to be a very dangerous drug to use, for hydrobromate of hyosine was known to all as a drug that should be used very seldom. It would be better to allow the mother to suffer as she always had rather than lose the child. If the contraindication to the use of scopolamin was uterine inertia, how was that to be determined when uterine inertia might come in the middle of a labor rather than the beginning?

(To be continued.)

CORRESPONDENCE.

REMOVAL OF BOTH BREASTS WITH SUBSEQUENT PREGNANCY.

To the Editor:

In your issue of October 1 is a report by Dr. William E. Park of a case in which, after removal of both breasts, a subsequent pregnancy presented a number of curious features. During the discussion Dr. Barton Cooke Hirst, while regarding the case of interest and worth reporting, questioned very much whether the phenomena connected with the subsequent labor were not purely coincidences rather than the result of the operation.

Removal of both breasts during the child-bearing period is undoubtedly a very unusual operation. My notes show that I performed an operation of that kind in 1895, the patient being a young woman who had been delivered some weeks before of her first child after a normal labor. Trouble followed in her breasts, and when she was brought to me both breasts were riddled with abscesses, the woman was septic and in most miserable condition. Both breasts

were promptly removed, my assistant removing one while I removed the other. She made an excellent recovery.

Since reading the doctor's report I have corresponded with the family physician, Dr. Knight, of Orient, and find that the patient since that time has had two full-term labors, and one labor at seven months, and one miscarriage at two months. Her physician informs me that there was nothing unusual during any of these pregnancies, or any of her confinements.

Very respectfully yours,

J. F. BALDWIN.

COLUMBUS, OHIO,
October 29, 1914.

REVIEWS.

DIE GEBURT DES MENSCHEN. NACH ANATOMISCHEN, VERGLEICHEND ANATOMISCHEN, PHYSIOLOGISCHEN, PHYSIKALISCHEN, ENTWICKLUNGSMECHANISCHEN, BIOLOGISCHEN UND SOZIALEN GESICHTSPUNKTEN. By Dr. Hugo Sellheim, Professor der Geburtshilfe und Gynäkologie und Vorstand der Frauen-Klinik at the Universität of Tübingen. With 132 Illustrations and 4 colored plates Tafeln. Wiesbaden, J. F. Bergmann, 1913.

Prof. Sellheim's book is the first volume of an extended series edited by the well-known Prof. Opitz, in which the entire domain of gynecology from the viewpoint of its German exponents is to be presented. The project is a very extensive one. Thus far forty-three volumes by different authors are in preparation. It is hoped to issue the entire work at comparatively short intervals as no definite appearance of the individual volumes is to be followed. Particular attention is to be paid to those topics which have been insufficiently presented in gynecologic manuals and text-books thus far issued, so that entire volumes are given over in the form of monographs to subjects which are ordinarily treated by the chapter. The question of treatment is also to be more extensively handled than heretofore and likewise the close relations between the generative organs and the body of woman as a whole.

Prof. Sellheim's extensive work on labor has been accorded the introductory volume of this extended series and to no one in Germany could this task have been assigned with better grace. The author presents in a most complete manner the course of labor in general and traces the mechanical relations in connection with the same in the most explicit and detailed manner. In his preface he calls attention to the fact that as regards the explanation of labor and its various processes a certain cessation in such research has occurred because of the difficulty of thoroughly comprehending the problem. Sellheim has therefore subjected the different views previously entertained to an extensive revision and has built up a new structure based on anatomical, mechanical, physical and physiological in-

vestigations, many of which are based on personal study and observation. It thus became necessary to revise the conceptions of the mechanism of labor and to study more closely the individual factors in their physiological significance and in their effects. Sellheim's attitude toward these mechanical factors is well known and to any one who has seen his collection of apparatus for demonstrating the mechanics of labor to students, the viewpoints of the author are made extremely clear and practical. He has among other things, added to our knowledge of the processes which govern the rotation of the fetal body and the mechanism of engagement and expulsion. The subject is, however, surrounded with many difficulties and a thorough study of the book itself is necessary to a proper understanding of the same. Whether the work will appeal to the general practitioner remains to be seen, but to the investigator of obstetrical problems and to the teacher of medical students, it will undoubtedly prove of great value. The book is not to be regarded as an obstetrical text-book and is not intended to displace the latter. It is a special monographic study of the course of labor, which is presented in a most detailed manner and so extensive that it will remain as a standard for many years to come. The illustrations are of particular value in elucidating the author's points and to them must be accorded a great deal of praise. An English translation of this valuable book is soon to appear and it is hoped will make this interesting work of still greater value, as the original German text is rather difficult to read.

A review of the book's contents is hardly possible, but attention may be called to the manner in which the author has divided his material. In the first section he describes the course of labor in general in well-fixed positions of the vertex. In the next section he describes the variations of the physiological course of labor, in which he ascribes to the primary position of the head the deciding factor in the course of the processes, distinguishing three types, primary flexion, primary extension, and an indifferent position between these two. Following this he considers breech presentations and the variations in the delivery of the shoulder girdle. The next section is taken up with a description of the individual factors of the processes of labor, tracing the relation between the uterus and the abdominal muscles, the genital passages and the uterine contents. In a final section Prof. Sellheim discusses the influence of pregnancy on the body and mind and the adaptability of the female organism to the processes of bearing children. An interesting chapter also deals with the preparations made by the organism during pregnancy, and finally the author concludes with the dictum that woman's greatest activity should be directed toward propagation and development of the human race and that nothing should be allowed to interfere with the same. Attention should finally be called to the extensive bibliographic references at the conclusion of each chapter.

This timely work of Prof. Sellheim is deserving of the highest praise, as an individual effort to place obstetrics on a high scientific plane and to stimulate collective research along lines that have un-

fortunately been neglected in favor of those based on clinical observations alone. It will serve as a contribution toward that millenium when medicine will be regarded not as art, but more as one of the exact, or approximately exact, sciences.

A MANUAL OF PHYSIOLOGY WITH PRACTICAL EXERCISES. By G. N. STEWART, M. A., M. D. Edin., D. P. H. Camb. Professor of Experimental Medicine in Western Reserve University, Clinical Physiologist to Lakeside Hospital, Cleveland; formerly Professor of Physiology in the University of Chicago; Professor of Physiology in the Western Reserve University; George Henry Lewes Student; Examiner in Physiology in the University of Aberdeen; and so on. With colored plate and 467 other illustrations. Seventh edition. Pp. 1132. New York: William Wood & Company, 1914. Price \$4.00 net.

This book was originally written for use by the student in the physiological laboratory and proved to be so useful and popular that it has gone through seven editions in the space of eighteen years and has become an acknowledged classic. In the present edition it has been found necessary, because of the rapid progress in biochemistry, to greatly enlarge and practically to rewrite the section devoted to metabolism. Important changes and additions have also been made in the chapters on Circulation, Respiration, Digestion, Absorption, and Internal Secretion. The blood-gases are considered more fully than in the last edition, and more space is devoted to the general phenomena of the action of enzymes. The newer work on the relation of heat production and the chemical changes in muscle to its contraction have been included. Throughout the work the chapters have been brought up to date. The general arrangement of the book has been retained though there are an increased number of chapters and sections. Some new illustrations have been added and some old ones redrawn. The typographical work and paper are excellent. We feel sure the book will hold its own and find many new friends.

ROSE AND CARLESS MANUAL OF SURGERY FOR STUDENTS AND PRACTITIONERS. Ninth Edition, revised by ALBERT CARLESS, M. B., M. S. Lond., F. R. C. S. Professor of Surgery in and Surgeon to King's College Hospital, London; formerly Examiner in Surgery to the Universities of London, Glasgow, Manchester, Liverpool and Leeds; Consulting Surgeon to the King Edward's Memorial Hospital, Ealing, and so on. 8 Vo., pp. 1408. 609 Illustrations and 16 full-page colored plates. New York: William Wood & Company, 1914. Price \$6.00 net.

As one of the most widely used text-books on surgery in our medical schools the ninth edition of Rose and Carless needs but slight introduction. The clarity and conciseness of statement which made the first edition an immediate success have been maintained through all the subsequent editions. The present volume has been carefully and thoroughly revised, the revision being marked not by any revolutionary ideas or startling novelties, but by the steady elaboration of ideas and methods already known and used. Much

attention has been given to salvarsan and radium. Room has been found for a new chapter on modern methods of treatment by heat, light, electricity, and other fresh subjects. Many new illustrations have been added and a few more colored plates. All this has been done without appreciably increasing the size of the book, which remains, as it has been from the first, a thoroughly practical and reliable manual of surgery.

THE MEDICAL RECORD VISITING LIST FOR 1913. Published by William Wood & Company, New York.

This well-known and favorite list is issued in red or black morocco binding, with or without dates, and arranged for thirty, sixty, or ninety patients a week. They are also issued in two books of six months each, fitted into seal or calfskin wallets, making the most elegant goods of the kind offered to the medical profession. The price ranges from \$1.25 for the regular list for thirty patients a week to \$4.00 for the special sealskin wallet and list for sixty patients a week.

Besides the visiting list with special memoranda and records of obstetric practice and engagements, vaccinations, deaths, addresses, cash account and so on it contains tables of maximum adult doses by the mouth in apothecaries and decimal measures, drops in a fluid drachm, solutions for subcutaneous injection and for atomization and inhalation, duration of pregnancy, approximate equivalents, emergencies, surgical antiseptics, and disinfection.

THE PHYSICIAN'S VISITING LIST FOR 1915. Published by P. Blakiston's Son & Co., Philadelphia.

This well-known list is issued for from twenty-five to one hundred patients a week dated, in a perpetual edition for thirteen hundred or twenty-six hundred names and in a monthly edition so that the whole months account can be kept in one place. Prices run from \$1.25 to \$2.50.

It has the usual list with special memoranda, addresses, vaccinations, births, deaths, and cash account together with tables of incompatibility, treatment of poisoning, weights and measures, dose table, emergency treatment of asphyxia and apnea.

A TEXT-BOOK OF PATHOLOGY, WITH AN INTRODUCTORY SECTION ON POST-MORTEM EXAMINATIONS AND THE METHODS OF PRESERVING AND EXAMINING DISEASED TISSUES. By FRANCIS DELAFIELD, M. D., and T. MITCHELL PRUDDEN, M. D. Revised with the cooperation of Francis Carter Wood, M. D. Tenth Edition. 8 vol., 1116 pages, illustrated by 14 full-page plates in black and colors. Wm. Wood & Co., New York, 1914. Muslin, \$6.00 net; leather, \$7.00 net.

To the entering class of the medical schools we take pleasure in introducing this standard volume on pathology. To the rest of the medical world a work which has reached its tenth edition needs an introduction just about as much as does a third-term candidate for the Presidency, and its reception is far more certain to be cordial.

As the publishers state in their note to the reviewer: "The book is so well-known and has enjoyed so great and so large a popularity, that much description is not necessary." This revision has involved no change in size but the addition of a few cuts and one plate on exophthalmic goiter. The textual changes are necessitated by recent advances in such subjects as x-rays and radium, lipoid degeneration, transplantation of tissue and of tumors, sporotrichosis, allergy and anaphylaxis, bacillus pyocyaneus, the crisis in pneumonia, acute anterior poliomyelitis, the identity of Brill's disease and typhus fever, Rocky Mountain spotted fever, pellagra, exophthalmic goiter, diabetes, pseudoleukemia, and acute ascending paralysis. We observe also changes in the technic of the Wassermann reaction, and stains for *treponema pallida*, a note on the luetin test, and alterations in the method of making frozen sections, in paraffin embedding, and in staining for glycogen. It is an admirable work brought thoroughly up to date.

H. D.

KIRKE'S HANDBOOK OF PHYSIOLOGY. Eighth American Revision.

Revised by CHAS. W. GREENE, A. M., PH. D. 8 vol., 780 pages, illustrated with 2 colored plates and 509 engravings in black and colors. Wm. Wood & Co., New York, 1914. Muslin, \$3.00 net.

Another book whose pedigree is its recommendation is Kirke's Handbook of Physiology, now appearing as the eighth American revision. The chief additions are in the section treating of internal secretions. Besides bringing the general text up to date, the writer has revised the portions treating of laboratory experiments with a view to simplifying technic. To quote from the publishers: "Kirke's is so well-known that a lengthy description is hardly necessary." It covers concisely and clearly, yet with sufficient thoroughness, the physiology, chemical and physical, of all the systems of the body. Not to have known it argues oneself unknown.

H. D.

PRACTICAL MEDICAL DICTIONARY of words used in medicine with their derivation and pronunciation, including dental, veterinary, chemical, botanical, electrical, life insurance and other special terms; anatomical tables of the titles in general use, and those sanctioned by the Basle Anatomical Convention; pharmaceutical preparations official in the U. S. and British Pharmacopeias and contained in the National Formulary; chemical and therapeutic information as to mineral springs of America and Europe, and comprehensive lists of synonyms. By THOMAS LATHROP STEDMAN, A. M., M. D. Third Revised Edition. Illustrated p. 1059. New York, William Wood & Company, 1914.

Born in 1911, the popularity of this dictionary has already exhausted two editions, with the consequent advantage to new readers of a thorough revision and enlargement. We have reviewed the earlier editions thoroughly, so give only a resumé of its plan. In words derived from the Latin or Greek the definition is given under the purer form, to which the reader is referred if a hybrid synonym exists. Synonyms are both noted under the word defined and also inserted as main titles with cross reference to the one selected for

definition. Eponymic terms are inserted as main titles and defined under the proper name. Words sanctioned by the Basle Anatomical Nomenclature are given preference, but their authority is noted. The inclusion of terms relating to the sciences allied to medicine is indicated in the title of this volume. Homeopathic and eclectic terms are included. Diphthongs have been omitted excepting as alternatives. Clearly printed, handsomely bound in flexible leather, of moderate size and weight, and thumb-indexed; its makeup and appearance are all that could be desired.

H. D.

BRIEF OF CURRENT LITERATURE.

OBSTETRICS.

Congenital Tuberculosis.—Werner Möller (*Arch. mens. d'obst. et de gyn.*, July, 1914) says that it is at present recognized that it is possible to have a congenital form of tuberculosis, but that this is extremely rare. The author gives the history of a case observed by himself. Tuberculosis of the placenta has been observed in a considerable number of published cases, which gives a condition in which it is quite possible to infect the fetus. In considering this subject we must take into account only cases that present the following conditions: true tuberculosis in which we can exclude an infection at the time of birth, or after birth. No diagnosis can be based upon microscopic or bacteriological examinations. Gärtner has shown it to be possible that the bacillus should be transmitted through the placenta by a tearing of the villi. Again they may be transmitted during parturition through aspiration of the germs from the genital secretions, or amniotic fluid, either of which may contain bacilli. The author believes that we should not include in our calculations any case which does not die within the two first weeks of life, and in which we can demonstrate tuberculous lesions and bacilli. Theoretically we can divide congenital infections into germinative, in which the bacilli are transmitted by means of the spermatozooids or the ovum, and intra-uterine where the infection takes place in the placenta, or by the umbilical vein, or through the amniotic liquid by the mouth. The feeble receptivity of the ovaries for the tubercle bacillus makes this an infrequent method of infection. The bacillus has never been demonstrated in the spermatozooids. There remains the intra-uterine method of infection: the ordinary placental infection begins in the intervillous spaces with formation of true tubercles at the surface of the villositities. The tuberculous tissue fills all the intervillous spaces and envelopes them without destroying the villi. Finally the vessels are obliterated and hyalin thrombi form. This obliteration retards the passage of the bacilli into the fetal circulation. A second site of appearance of tuberculous tissues is primarily in the villi themselves. The third is localized in the serotina, cheesy basal endometritis of the decidua. In the author's case there was a pronounced tuberculosis with typical microscopic lesions and presence of bacilli in a child which died two days after birth.

Retention of the Membranes after Labor at Term.—M. Guidal (*Arch. mens. d'obst. et de gyn.*, May 1, 1914) says that as a basis for his study of the subject of the retention of membranes after normal labor he has searched the records of the Maternity at Copenhagen for the years 1903 to 1912 during which time there were 14,078 deliveries, in 346 of which there was retention of the membranes, that is in 2.5 per cent. The percentage in other countries varies according to statistics between 20 and 1 per cent. Credé showed 4.8 per cent. after his form of expression. At Copenhagen the uterus is controlled after delivery for a half hour. If delivery has then not taken place the Credé expression is used. If not successful, anesthesia is induced and expression continued; then artificial delivery is resorted to. During the puerperal condition the treatment is purely symptomatic; hemorrhage is treated by ergot, pain by hot applications, and fetid lochia by vaginal douches of chloride of lime. Hemorrhage was never severe. There is some risk of infection. Passive conduct is advocated in Germany, but active measures are used in France and England. In 32 cases there was elevation of temperature of extra-genital origin, and in 119 there was fever of obstetrical origin. Thus we see that retention of the membranes is a risk of infection. But one-half of these infections were very slight. If no active interference is undertaken the membranes come away piecemeal or in imperceptible particles which pass away in the lochia. The author concludes that the treatment during delivery plays an etiological rôle in the retention of the membranes and it is favored by active intervention. It is more frequent when there are placental anomalies. It does not cause hemorrhage during delivery. The percentage of morbidity is somewhat increased by retention of the membranes, but this cannot be entirely prevented by removal of the membranes artificially. The membranes will normally, be removed molecularly or in pieces within ten days. This may be one of the causes of endometritis.

Use and Abuse of Obstetric Forceps.—B. P. Watson (*Canada Lancet*, 1914, xlvii, 910) sums up as follows the situation in those border-line cases where, with a pelvis normal in size or slightly contracted, there is a disproportion between the fetal head and the pelvic brim, and the head has failed to engage at the beginning of the second stage. Immediate application of forceps will result in death of the child in at least one-quarter of the cases, and there will be a maternal mortality of from 1 to 5 per cent., and a morbidity which is difficult to estimate, but which is certainly very high. If the labor be allowed to continue without interference, spontaneous delivery will occur in about 75 or 80 per cent. of the cases, with a fetal mortality of between 1 and 2 per cent. Cesarean section, performed before any attempt has been made to deliver with forceps, should give a practically negligible fetal mortality, and a maternal mortality of 2 or 3 per cent. The performance of the operation after one tentative application of the instrument, provided this and all previous manipulations have been done with aseptic precautions, gives almost equally good results.

The conclusion is inevitable that in those cases where the dispro-

portion is slight the best results for mother and child will be obtained by allowing labor to continue until spontaneous delivery occurs, or until the head has entered the pelvic cavity, when forceps may safely be applied. Where the disproportion is greater Cesarean section, performed as early as possible, will give the best results. If spontaneous delivery does not occur, and the head does not enter the brim, one attempt at forceps delivery may be made, but extreme force must not be used. Failure of the head to come through should be followed by Cesarean section, pubiotomy or craniotomy, according to the circumstances of the case.

Cesarean Section.—T. F. Greene (*Boston Med. and Surg. Jour.*, 1914, clxxi) presents an historical review and an analysis of sixty personal cases of Cesarean section with no maternal and only one fetal death. He emphasizes the fact that these results argue in favor of the early operation. He cannot agree with Hirst that we ought to test our doubtful cases by a long labor and by a cautious application of the traction rods for at least twenty minutes. This is a practice that should not be encouraged, for it carries with it a mortality that Cesarean section should not be burdened with, and it tends to lead the obstetrician into operations of high forceps and version, which are afterwards very much regretted. It may be generally stated that an indication for Cesarean section exists when an obstetrician, after a careful study of his case, is convinced that the child can only be born after a difficult instrumental or other form of delivery that may seriously cripple it for life, if it does not cause its death, and which subjects the mother to the possibility of extensive laceration, with shock and probably impairment of her future health. Formerly there was but one indication for Cesarean section, and that was the so-called absolute indication; but to-day it may be truly said that all indications are absolute. In determining these indications, each operator must rely upon the results of his own experience. He must consider the size and the shape of the pelvis; the relative size of the child, its position, and the extent of ossification of the head; he must also estimate the ability of the mother to force that child through the maternal canal within a reasonable period of time. The Cesarean section should be an operation of election.

GYNECOLOGY AND ABDOMINAL SURGERY.

Solid Teratoma of the Ovary.—A. Falco (*Ann. di Ost. e Gin.*, May 31, 1914) has made a study of the malignancy of teratoma of the ovary in literature, apropos of a case operated on by him. The patient was operated on for an ovarian tumor which was shown by histological study to be a teratoma. Four months later she came again to the hospital with a return of the tumor in the ovarian region and nodules in the peritoneum and mesentery. The second operation showed that the tumor was not entirely removable, and the patient died forty days later of the cachexia resulting. Examination of the specimen showed tissues belonging to both the mesoderm and ectoderm. There were myxomatous connective tissue, fibrous,

embryonal, adipose and cartilaginous tissues and unstriped muscular fibers. Also from the ectoderm epidermis with sebaceous glands and structures resembling thyroid. The author finds ninety-three reported cases of teratoma. The genesis of teratomata is as yet uncertain. The theory that there is an ovarian pregnancy is of only historical interest. An ectodermic invagination does not fit the author's case etiologically. The principal facts to be considered are the tridermic structure, their presence in men and women both, and their preferred location in the genitals. Parthenogenesis has been given as a source of such tumors, but this is as yet not demonstrated even in the lower animals. Fetal inclusion while suitable to explain some teratomata is not a plausible explanation of all. The cystic teratomata are generally regarded as benignant, while the solid are malignant, as was the author's case. The tumor is never correctly diagnosed because it shows no typical symptoms, not common to all ovarian tumors. Operation only shows the kind of tumor with which we have to deal. Thus the prognosis must always be reserved in such cases. The symptoms caused are principally due to pressure on the other organs of the abdomen and pelvis. The degree of malignancy seems to be less than that of carcinoma, for the tumors grow to a much larger size without causing a cachexia that is fatal. The author's case shows that recurrence in other organs and structures may take place. The author's conclusions from his study are these: Solid tumors of the ovary of teratomatous nature are malignant as is shown by the histological examination. Their diagnosis is generally impossible, and only operation can give any hope of cure. No cases of spontaneous cure are known. Both solid and cystic teratomata are probably due to inclusion of fetal tissues, or development of a twin embryo.

The Treatment of Amenorrhea with the Intrauterine Stem.—Riech (*Zentralbl. f. Gynäk.*, No. 30, 1914) refers to twenty-two cases in which this method was employed, all of which were endopathic in character, dependent on functional disturbances of the uterus or ovaries and not due to mechanical conditions or constitutional disease. In three cases there were no results although the pessary had been allowed to remain for a period of six months. In the nineteen remaining cases a complete amenorrhoea was present in seven, and oligomenorrhoea in twelve instances. In the former group a complete cure resulted, the effect being noticed in from ten to fourteen days in the severe instances after two or three months. In the second group an increased flow resulted usually with the next succeeding period. The author considers the method invaluable for the functional disturbances noted, both for the establishment of the menstrual flow and the subsidence of symptoms. He considers the method free from danger if care is employed.

Concentrated Formalin in the Treatment of Climacteric Hemorrhages.—Gerstenberg (*Zentralbl. f. Gynäk.*, 1914, No. 35) in commending this procedure, claims that if after two applications the bleeding from the uterus is not stopped, that a condition of myoma or carcinomatous disease is present in the uterus. In place of irri-

gating with dilute solutions of formalin, the author advises the application of the concentrated material, by introducing a sound into the cavity and leaving it in place for almost a minute; the sound having been placed in concentrated formaldehyde for ten minutes previously.

Parovarian Dermoid Cysts.—Vautrin (*Bull. de la Soc. d'obst. et de gyn. de Paris*, June, 1914) says that dermoid cysts are as frequent in the parovarian region as in the ovary itself. In order of frequency we encounter them in the ovary, parovarium, vesicouterine serous folds, on the posterior surface of the broad ligament, in the pelvisacral region, and in the pelvic floor. The parovarian are generally near the hilum of the ovary. They take on a development under the serosa about them and at the side of the uterus which they crowd up on. The evolution, complications and therapeutics of the parovarian differ from those of the pelvic floor. The author has operated on eighteen simple parovarian dermoids, and five bilateral ones. If the parovarian dermoid remains sessile it is in contact by one pole with the serosa and by the other with the numerous vessels of the ligament. Sometimes it becomes entirely surrounded by serosa and forms a pedicle, which may be twisted or ruptured. It may separate the vascular and lymphatic elements and infiltrate deeply between the uterus and pelvic wall. These tumors are frequently bilateral. The preferred location is at the periphery of the ovary. The ovary, irritated by its nearness to the cyst, becomes modified in structure and function. Still the dermoid can always be separated from the ovary with which it is associated. Menstrual troubles may result from the modification of the ovary, and abortion has been the result. Sterility is absolute when the follicles become atresic. After being quiet for some time the dermoid under some unknown impulse may begin to develop rapidly in size, and this may occur after the menopause, causing congestion, inflammation, and degeneration to take place. Its size may drag the tumor and ovary down into the pelvis. These tumors are subject to adhesions to the intestine and perforation may occur. The complications are serious: they are torsion of the pedicle, suppuration, and infection. Infection occurs in the course of infectious diseases and by the streptococcus, staphylococcus, colon bacillus, and bacillus of Eberth. They reach the dermoid by contact, by adhesions, and by the blood current. Every dermoid cyst should be considered dangerous on account of the ease with which it fixes infective agents. The size increases, much fluid and many leukocytes enter the tumor, and the tissue softens. Degeneration may be malignant. If the dermoid is still quiet and has had no bad effects enucleation is easy. It should be conservative so as to preserve the genital function. If the growth is intraligamentous it will be difficult to separate from the surrounding structures. Suppuration is a very serious complication because rupture will cause peritoneal infection. We cannot puncture and aspirate for we may cause rupture of the cyst. Every adherent dermoid should be feared as operation will be difficult.

DEPARTMENT OF PEDIATRICS.

TRANSACTIONS OF THE NEW YORK ACADEMY OF MEDICINE.

SECTION ON PEDIATRICS.

Meeting of October 8, 1914.

WILLIAM P. NORTHRUP, M. D., *in the Chair.*

INFANTILE SCURVY: THE BLOOD, THE BLOOD-VESSELS AND THE DIET

DR. ALFRED F. HESS and MISS MILDRED FISH presented this communication which was a study from the Research Laboratory of the Department of Health of New York City. It was chiefly concerned with scurvy as a hemorrhagic disease. Attention was especially directed to a study of the coagulability of the blood with the object of ascertaining whether there was any marked change in this particular and whether a disturbance of this function could account for the various hemorrhagic symptoms of scurvy. It was now known that coagulation was closely associated with the platelets of the blood, and an examination of these cells was also carried out. In addition a routine examination was made of the red and the white blood corpuscles and of the hemoglobin. In the course of their investigations their attention was gradually directed from the blood to the blood-vessels. They found it urgent to seek some means by which they could distinguish between hemorrhages due to the weakness of blood-vessels, and those which were the result of some defect of the blood itself.

This study was based in the main upon numerous cases of scurvy which had developed during the past few years in the Hebrew Orphan Asylum. They were dealing, therefore, with a group of institutional infants concerning which they had clinical data covering a long period previous to the onset of the disease, and whose welfare they had been able to follow for many months following their recovery. A number of these cases developed in the course of an attempt to disperse with the giving of orange juice. In view of the fact that pasteurized milk was now heated to a temperature of only 145° F., which was claimed by many (including the Commission on Milk Standards) not to destroy its chemical constituents, it seemed that infants should thrive on this milk without the addition of fruit

juices to their diet. In obtaining blood for the tests of coagulability, about 5 cm. was obtained from the jugular vein and allowed to flow into a one per cent. solution of sodium oxylate in the ratio of one to ten. In no case were the coagulation tests made from blood obtained from the prick of a finger or the lobe of an ear; for these methods could not be relied upon as they introduced the disturbing factor of the thromboplastic substance of the tissue juices and thus did not yield an accurate estimate of the coagulability of the blood itself. The simple fact of not entering a blood-vessel at the first attempt had been found to invalidate results. The oxylated blood was immediately centrifuged for fifteen minutes at high speed, and the plasma pipetted off for examination. The coagulation tests were carried out after the method of Howell, which was by the addition of five drops of plasma to each of five small test-tubes. To these tubes increasing amounts of one-half per cent. calcium chloride made up in normal salt solution was added. The time was then noted when the plasma in the various tubes was clotted. This time was designated as the coagulation time. In addition to these tests a test was made for antithrombin in many cases. In all the tests, whether for prothrombin or antithrombin, control tests of normal plasma were made under identical conditions. The tables showed that the plasma of the scurvy cases generally clotted more slowly than that of the controls, in other words, that there was a slightly diminished clotting power of the blood in scurvy. This property, however, was not absolutely constant and therefore not an essential manifestation of scurvy. A study of the tables showed that this diminished coagulability was not due to an increase of antithrombin, the tests being uniformly convincing in this regard. The speaker discussed quite fully the question of the deficiency of calcium in the blood, not only because the substance was of prime importance in coagulation, but in view of the fact that some have claimed that the calcium content was decreased in the tissues in scurvy, whereas, others had found it to be increased. Although their tables did not enable them to state whether there was a slight decrease of prothrombin, they did enable them to judge whether a relative deficiency of calcium existed. From a physiological standpoint this was the only type of calcium deficiency that was important; a condition of negative calcium balance, where the calcium was insufficient to bind all the prothrombin; and, where, as a consequence, coagulation was retarded. Such a condition did not exist in infantile scurvy. The slight defect in coagulability could not be attributed to a relative insufficiency of calcium. Whatever may be the finer physiological cause, the slight defect in the clotting power of the blood, which they had noted played but a secondary rôle in this disease, the characteristic hemorrhages were the result of quite a different pathological condition.

In addition to the coagulation time of the blood, the bleeding time was of importance. This term referred to the time which it took for the blood to cease flowing after a puncture into the tissue. For this purpose a prick might be made into the lobe of the ear and the time noted when the blood ceased to flow. In two cases, one mild

and the other pronounced, there was found to be a prolonged bleeding time. In other cases which seemed equally advanced a prolongation of the bleeding time was not met with and so they concluded that this abnormal condition might occur but that it could not be considered characteristic of the disease.

Another table showed the result of the examination of platelets. Although they were unable to obtain uniform counts from day to day, nevertheless the number of platelets was found in all cases to fall within normal limits. There was no marked decrease in the number of platelets such as had been described in connection with some hemorrhagic conditions. In other particulars the blood showed the changes which were commonly associated with secondary anemia. There was a relative as well as an absolute deficiency in the hemoglobin, a slight decrease in the number of red blood cells, occasionally the appearance of a nucleated red cell, and an increase in the number of leukocytes. It was impossible to state whether this moderate leukocytosis had any specific connection with the disease. In connection with these blood changes they called attention to the regeneration of hemoglobin and of red cells during the convalescence of the disease.

What then was the cause of the bleeding that dominated the picture of this disease? When it was found that the hemorrhages could not be accounted for by a defect in the clotting power of the blood they directed their attention to the blood-vessels. They devised a "capillary resistance test" which was as follows: A blood-pressure band was placed about the infant's arm in the usual manner. A Tycos apparatus was used and the blood pressure rapidly raised until it reached the 90 mark. After the pressure had been maintained for three minutes the band was removed, and when the blueness had faded an examination was made for petechial spots. Numerous cases of scurvy were tested by this means, and in addition many normal cases served as control observations. It was found beyond question that the scurvy cases reacted abnormally. In these infants the forearm would show many petechiæ. Where an eruption, such as eczema or prurigo was present on the forearm, the petechiæ developed especially at the site of the lesion. The capillary resistance test was brought forward, not as a specific test for scurvy, but rather as a method of bringing to view a weakness of the vessel walls from whatever cause. They had found it to be positive in various cases of toxemia and it would no doubt be found present in some of the purpuras, which occur more frequently in adult life.

In their experience petechiæ had been present very frequently in the early stage of the disease. It was probable that their presence had not been emphasized because they had not been sufficiently sought for. In adults who spent much time in the upright position petechiæ were more usually found on the lower extremities. On the other hand, as might be expected, in infants they were most frequently seen on the upper part of the back and the neck, though no portion of the body was entirely spared.

They were found in the mucous membrane of the hard and soft palate, and in several instances in the palpebral conjunctiva, appearing just as they do so typically in cases of bacterial infection of the blood. The blood in the urine might probably be considered as evidence of petechiæ into the internal organs. In postmortem examinations small hemorrhages have been found in the pleura, peritoneum, and pericardium, in addition to the large extravasations which were found beneath the periosteum.

Edema must also be considered as being typical of an increased permeability of the vessel wall. Edema of the eyelids and of the ankles were well-known clinical manifestations of the scurvy of infants as well as of adults. A comparison of scurvy and hemophilia brought out a striking contrast. In hemophilia petechial spots were not found scattered over the surface of the body, nor was edema a symptom of the disease. On applying the capillary resistance test in cases of hemophilia it was found that petechiæ were not induced by this increase in vascular pressure. In other words, in hemophilia the vessels seemed to be normal. In scurvy the hemorrhages were usually minute and numerous; in hemophilia they were few and extensive. When one made a subcutaneous puncture of an infant suffering from scurvy, it was found that very often a small hemorrhage developed at the site of the puncture wound. This was not the case when one made a subcutaneous puncture in a normal person. This puncture test was unreliable, however, as a means of diagnosis as the minute hemorrhage did not always appear at the surface.

Among the clinical observations to which the speaker called attention were that there was a prescorbutic and a postscurbutic period, the former frequently passing unnoticed. They had had exceptional opportunities for observing the disease in the early stages and in many cases they found the petechial spots as the first evidence of incipient scurvy. The classical tenderness of the extremities was very often observed first by the nurse, and in other instances the pallor of the infant led to the diagnosis. English authorities had laid special stress on the finding of red blood cells in the urine as of diagnostic value in early scurvy, but they had not found this sign at all constant. Hemorrhages could frequently be produced by a little sharp rubbing of the gums; this was a little expedient that would be found at times of diagnostic value. There were no symptoms which could be considered as preeminently the primary sign of scurvy; each varied in its time of appearance. According to their experience the infectious diseases did not play an essential rôle in the production of infantile scurvy. Although the relationship between rickets and scurvy was questionable, they believed that the condition described by Czerny as the "exudative diathesis" was definitely associated with the incidence of infantile scurvy. Investigation had revealed the fact that almost all the cases that developed scurvy had the "exudative diathesis." This was true in ten of twelve cases under their observation. It was impossible to state whether this clinical relationship was one of summation or whether the pathological states were dissimilar, the "exudative diathesis" merely rendering

the tissues more vulnerable toward scurvy. It was not without significance that the blood-vessels in the exudative diathesis showed a decided weakness and increased permeability.

As to diet, the group of infants which they particularly observed were fed on various preparations of milk and their diet was in no wise changed, except that an attempt was made to do without orange juice. During the past three years they had had a considerable number of cases develop scurvy which were being fed on pasteurized milk. In 1912, when the first cases were noted the milk was heated to 165° F. for twenty minutes. During the past year the milk had been heated to 145° F. for thirty minutes. Nevertheless they had had several cases of scurvy develop on this diet. Four infants fed on malt soup all developed scurvy; these children also had the "exudative diathesis," but it could also be accounted for by the fact that in the preparation of this food the milk was heated twice. Evidence was adduced to show that the pasteurized milk was not the only factor in the production of the disease. That the pasteurization did play an important rôle was shown by the fact that by substituting raw, unheated milk, for the pasteurized milk, the formula and the amount of food remaining unchanged, the scorbutic symptoms disappeared. However, raw cow's milk must not be considered as having potent antiscorbutic properties. Its effect could not be compared to the miraculous change brought about by giving orange juice. It was possible that in addition to the pasteurization of the milk there were other factors in connection with the milk which entered into the causation of scurvy. They had given orange juice that had been boiled for five or ten minutes and found that it gave satisfactory results. They had also substituted the juice of orange peel for the orange juice. The orange peel was prepared by grating and adding it in the ratio of one ounce to two ounces of water, a small amount of sugar being added to overcome the slightly bitter flavor. This seemed to serve the same purpose as the orange juice itself. It was being used at the Asylum at the present time and they had come to the conclusion that it had marked antiscorbutic properties. According to their experience the efficacy of vegetables could not be compared to that of orange juice. It was possible that vegetables might lose their antiscorbutic properties if cooked to a high degree. Potato had proved an excellent antiscorbutic. They had employed mashed potato, a tablespoonful of boiled potato being added to a pint of water, using the water in which the potato was boiled. This was found very efficacious, although it did not bring about the sudden change that was sometimes seen when orange juice was given. So far as was known there was no physiological reason why orange juice or potato in small quantities should not be given to an infant a few weeks old. It would seem worthy of trial to substitute potato water for barley water in the mixtures of pasteurized milk which were being distributed by the various diet kitchens in the larger cities. This would obviate the necessity of constantly admonishing mothers that they should not omit the orange juice from the daily diet of their infants.

Cod-liver oil or olive oil though given for some weeks did not prevent the development of scurvy. The speaker discussed the part played by the "vitamines" in the prevention of such diseases as beri-beri, scurvy, pellagra and rickets. It might seem that this material was supplied in the mother's milk and this accounted for the fact that nursing infants did not develop scurvy.

DISCUSSION.

DR. SIDNEY V. HAAS wished to express his pleasure in hearing this interesting paper. There were a few points, however, on which he disagreed with Dr. Hess. One of these was that the "exudative diathesis" was an important etiological factor in scurvy. In hospital and dispensary practice from fifteen to twenty per cent. of all cases had the "exudative diathesis" and yet there was no disease rarer among this class of patients than scorbutus. In the days before they had certified milk, sterilized and pasteurized milk were used and very little raw milk and even then there were few more cases of scorbutus than at the present time. The observations upon which the paper was based were made at an infant asylum and it was well known that where either infants or adults were collected in large numbers this disease was apt to be more prevalent. It was interesting to know how early in life this disease had been observed. This was a surprise. At the infant asylum they had the experience that after cutting out orange juice with 200 children sixty-five of the number suffered from gingivitis or stomatitis. With the return to orange juice the cases all cleared up and within two weeks they had all recovered.

DR. WILLIAM P. NORTHRUP used to think it very queer that a family living out of town and having a Jersey cow on the place sent to town for proprietary food for the baby. This resulted in a case of scurvy. In his experience it seemed that subjecting milk to hard boiling was a factor in the production of scurvy. There was no scurvy if the child had the witching drop of orange juice. There were three conditions in which the pediatrician could do miracles, one was with orange juice in scurvy, another was thymus for cretinism, and the third was intubation for diphtheria of the larynx. Dr. Northrup asked if there was a possibility that infection might play a part in the production of scurvy. Was there any such an element?

DR. Northrup related an experience which he had in trying to discuss this subject with Professor Variot of the Belleville Clinic. The Professor could not understand English very well while he himself could not speak much French. He had tried to relate an instance of two infants nursed at the same breast, one was a nursling and the other the mother's own child. The nursling developed scurvy while the mother's child was fat and healthy. He had had great difficulty in making Professor Variot understand that scurvy could occur in a child at the mother's breast or even on fresh cow's milk. The phenomena of scurvy was so distinct, yet

so difficult to explain, so easily cured and yet the most extraordinary which the pediatrician saw.

Dr. Northrup stated that he had reported the first eleven cases occurring in American practice to the American Pediatric Society. He had seen the first case at the Foundling Hospital, and as pathologist had diagnosed it syphilitic hemorrhagic periostitis. Dr. Van Sandvroot said it reminded him of a case in which the child had eaten chalk, sand and other articles and at autopsy they concluded that the child had scurvy; he did the same. One found cases of scurvy in well-groomed families where the greatest care was taken of the child's diet. These children, too, recovered on orange juice.

Dr. J. FINLEY BELL, of Englewood, N. J., had had a case of scurvy about three months ago which had been fed on Borden's nine cent milk. It was claimed that this milk was not heated twice. The child was cured by orange juice in about three weeks.

Dr. Northrup said that after a free discussion of scurvy he once asked Dr. Ripley whether he had not in his vast experience run across similar cases. (Dr. Ripley, by the way, was an old friend of Dr. James O'Dwyer, and was sometimes called a specialist in all lines, so well-informed was he.) Dr. Ripley said he had seen such cases, had called them sometimes acute rickets, sometimes syphilitic osteotitis, treated them with citrate of potash and mercury, and after a time cured them.

Dr. ALFRED COLE WALLIN made reference to an article which he had written on the subject of scurvy which appeared in *Pediatrics*, August, 1914, in which he gave evidence confirmatory of the theory that scurvy was an acquired disease, with a hemorrhagic diathesis, from improper feeding, causing alkalinity, and that most cases had symptoms of indigestion of an alkaline nature. He stated that he had seen four cases of scurvy in breast-fed infants within the past nine months, and that he had attributed them to the alkalinity of the mother's milk. The children were entirely breast fed, excepting one which was partly fed and partly nursed. They ranged in age from four to eight months.

Dr. Northrup referred to the last case of scurvy which he had seen and stated that the child had developed the disease on a malt soup diet. He concluded that there were many different foods that might cause this condition, that it was the unvaried monotony on various foods that might produce it.

Dr. Alfred Cole Wallin stated that he had seen several cases which were fed on pear juice and they seemed to get worse. He thought this was possibly due to the alkalinity of the pear juice and asked Dr. Hess what his opinion was.

Dr. HESS said in closing, in regard to infection as a source of scurvy, that he had read what Dr. Caillè had written in the report of the American Pediatric Society. He had observed the condition characterized by some leukocytosis, and slight fever, what the Germans called Barlow fever. The fever was very slight and there was no epidemic; it is difficult to picture an infectious disease being controlled at will by means of orange juice.

They had considered making tests of the alkalinity of the blood, but such tests seemed so uncertain that they had not been done; they did not seem to promise enough. He felt sure that with the pear juice it was not the alkalinity that caused the trouble; but why use pear juice when orange juice was so good and no case of scurvy was known to have developed on it. They could also give the juice of the orange peel as he had described.

As to the question whether he had undertaken any animal experiments—he had not done so as such experiments could not show more than that orange juice was a curative agent, and that had been demonstrated on human beings.

He had observed that scurvy occurred more frequently in private practice where infants were well cared for. The institution in which he had made his observations was an excellent one, and this fact must be taken into consideration in connection with the facts presented.

As to the mashed potato, they used one tablespoonful of mashed potato to one pint of water and this prevented the onset of scurvy.

DR. ROYAL STORRS HAYNES asked Dr. Hess whether he had observed purple gums before the eruption of the teeth and also whether after the teeth had come this phenomenon appeared first before or behind the teeth, the occurrence of the hemorrhage into the gums behind the teeth first being characteristic in Dr. Haynes' experience, and perhaps being due to the pressure of the tongue against the gum in that situation.

DR. HESS replied to Dr. Haynes' question that he had never seen the purple gums unless the teeth were erupted or about to erupt. He had never seen them where there were no teeth coming through.

DR. BELL, Englewood, N.J., observed that there might be danger from the potato water as there might be solanum in the water in which the potato was boiled.

DR. HESS replied that if it was demonstrated that there was such a poison the water from the potato should not be used, but that they had never had any unpleasant results from its use.

DR. NORTHROP reiterated the belief that it was the deadly monotony of an insufficient diet that was responsible for this condition and that any fruit juice or other change that broke up the monotony might be curative. He asked Dr. Hess whether in his study of the coagulability of the blood they had used any other drug beside calcium.

DR. HESS replied that the only drug they had used was calcium and they had found that there was already enough of that in the blood.

BRIEF OF CURRENT LITERATURE.

DISEASES OF CHILDREN.

No Isolation for Measles and Scarlet Fever.—Marie Nageotte-Wilbouchewitch (*Presse méd.*, June 13, 1914) inveighs against the present regulations which compel isolation of children affected by scarlet fever, measles, chicken-pox and other infectious diseases of children. These regulations often result in great hardships for both parents and children, yet they do not prevent the spread of these diseases, epidemics of which occur every year. She advocates the use of the method of Milne for rendering these diseases harmless and preventing their spread. The method consists in beginning to disinfect the throats of children even before the diagnosis is made with solution of phenol in olive oil, swabbed on the throat every two hours for twenty-four hours. In scarlet fever this is sufficient, but in measles it should be continued three days. Phenol thus employed is not irritating, but anesthetic, and makes swallowing easier. The mouth and teeth are also disinfected. The skin is oiled with essence of eucalyptus all over the surface of the body, night and morning for four days, then once a day for ten days. During the period of coughing in measles a sort of hoop is placed around the head from which is suspended a thin veil of gauze wet with eucalyptus. The sickness becomes benignant and complications of the throat and respiratory organs infrequent. Sick and well may occupy the same bedrooms; the duration is lessened, and the disease is over at the end of ten days. Contagion is absolutely suppressed. The patient lives in an atmosphere of eucalyptus. All isolation is unnecessary; the patient remains with his family and returns to school at an early date. All the clothing and bedding are rendered innocuous and need not be disinfected after the sickness is over. Milne has tried this method in homes where many children were congregated with the result that epidemics ceased to spread there. The author thinks that there are great advantages in the adoption of this method of treatment instead of the senseless and ineffective method at present used.

Röntgen-ray Treatment of Hypertrophy of the Thymus.—Walther Kaupe (*Monatsschr. f. Kinderheil.*, Bd. xiii, Nr. 2, 1914) questions whether Eggers is right in advocating the use of the x -rays in every case of hypertrophy of the thymus. Many of these cases will recover without any treatment, so why should the rays be applied to every case, whether needed or not? The application is not only unwise but is contraindicated. Operative treatment is needed in only a few cases. The author cites four cases of laryngeal stridor observed by him, in none of which was operation or other treatment

needed. Since the rays do not harm they may be used without damage, but are not necessary.

Atrophy in the Nursling and Congenital Lesions of the Liver in the New-born.—Henry Barbier and Maurice Cleret (*Arch. de méd. des enf.*, June, 1914) say that the natural history of athrepsia is not finished. There are cases of athrepsia who are not subject to gastro-enteritis. In reality there are two influences that affect the health of infants, anatomical and functional integrity of the organism from birth and conditions of life. Anatomical integrity is dependent on the heredity and health of the mother during pregnancy, that is it is conceptional and hereditary. Under good conditions of life the hereditarily weak child may develop normally. But when conditions are unfavorable and the hereditary defects are too great there will be a fatal issue in spite of the best treatment possible. The authors' post-mortem examination of the liver goes to show that a part of the disorders of this nature are due to changes in the internal organs, especially the liver. The pancreas, intestine, thyroid, lungs, and muscles may show lesions. Lesions of the liver are the cause of many cases of athrepsia. It is especially the children of syphilitic, alcoholic, and tuberculous parents that show these liver lesions. In tuberculous cases lesions are found of an age that would show them to have occurred early in life. Here one sees sclerosis or fatty degeneration of advanced degree. A similar condition is found in syphilis. In alcoholism there is insufficiency with icterus. These same lesions may be found in the other internal organs. The umbilical vein distributes the adulterated blood to other organs as well. Coming into the world with a lesion of the liver, these infants have digestive insufficiency. They show anaphylaxis to all forms of albumin.

Acute Nephritis in Infants with Disturbances of Digestion.—Fritz Frank (*Arch. f. Kinderheil.*, Bd. lxiii, H. III and IV, 1914) says that although nephritis is less frequent in infants than in older children, still a considerable number of cases are published. The reason why there is this smaller number of cases in infants is that they are less exposed to contagion from infectious diseases which cause nephritis than the child who goes to school and mixes daily with other children. Again many cases of nephritis are due to infections by the pus-producing germs, streptococcus, staphylococcus, etc. To these also the infant is less exposed. Syphilis causes some cases of nephritis. Another set of cases is caused by poisoning with various metals and chemicals, and to these also the infant is not exposed. Winogreff found nephritis present in twelve of twenty-five kidneys of the fetus examined by him. Such a condition might result during intrauterine life through poisons absorbed from the mother, either of an infectious nature or due to autointoxication. This is plausible on account of the fact that the kidneys begin to functionate at an early period of intrauterine life. Nephritis in the fetus may be shown by undifferentiated embryonic cells left in the fetal kidney and generally considered to be inflammatory round cells. Also masses of coagulated albumin may be found in the glomerular capsules

and canals. Of less importance, according to the author, are the cases resulting from disturbances of digestive functions. These cases are given undue importance by some authors, and thus some even considered this to be always the cause of nephritis in infants. There are two theories of the causation of nephritis, the toxic and the infectious. If intoxication is the cause albuminuria and casts will be present but there need not have a true nephritis. In many children who die with toxic symptoms no nephritis is found postmortem. Etiological factors in infection cases may be bacillus coli communis infection from the intestine, or infection from otitis media; or ascending infection from the bladder. Out of 452 cases examined postmortem in the service of Dr. Lubarsch at Kiel, nephritis was found in seventeen and pyelonephritis in five, that is a percentage of 4.86. Among the twenty-two cases of which histories are given by the author are instances of an exudative form with hemorrhage, with purulent exudate, with lymphocytic infiltration, an alterative form, and a mixed form. The reason for the greater frequency of the hemorrhagic form is found in the permeability of the infantile blood-vessels. In Lubarsch's examinations he frequently found lesion in the spinal cord, especially near its surface, in greater or less number showing exudation and diapedesis. This helps to explain the frequency of the hemorrhagic form. In eighty-eight cases were found lesions of the alterative form of nephritis in a stage of regression, such as changes in the parenchyma, transudation, fatty epithelium, and even calcareous changes. In cases in which both kidneys are affected and there are bladder and pelvic changes also, a hematogenous origin is probable. In a second set of cases a urogenous origin is possible. An ascending infection will cause widespread kidney lesions. In some cases the infective organisms are added to a failing nutrition from digestive disturbances, which are an important factor in the causation of nephritis. Only one-third of the author's cases had nutrition, which goes to show that this is far from the invariable cause of nephritis. The author's conclusions are these: acute nephritis in infants is frequent; it is generally of exudative nature; all sorts of infections and disturbances of nutrition play an etiological rôle.

The Blood in Melena Neonatorum.—Elis Lövegren (*Jour. f. Kinderheil.*, Bd. xxix, H. 6, 1914) says that in all probability the main cause of this disease is to be found in a disturbance of the function of the blood organs. To support this theory the author cites the anatomico-pathological changes found by him in the blood, and the results of clinical observation. There is an undoubted effect on the hemorrhage from the use of subcutaneous injections of gelatin solution. The author has never lost a case treated in this way. Also the excellent results obtained by direct transfusion of blood supports this theory. The treatment with blood serum and defibrinated blood is interesting. The author gives histories of two cases treated with gelatin solution with relief from imminent collapse. Coagulation time was increased. Before treatment there was no tendency to the formation of rouleaux. The author thinks that slow coagula-

tion and changes in the red blood cells are at the bottom of this condition.

Changes in the Respiratory Curve in Children with Spasmophile Symptoms under the Influence of Sudden Slight Shocks and their Value in the Diagnosis of Latent Tetany.—M. Masslow (*Monatsschr. f. Kinderheil*, Bd. xiii, Nr. 2, 1914) says that he has made a study of the effect of slight irritation on children with spasmophile symptoms with the object of assisting in the diagnosis of tetany. The increased nervous irritability of these children is well known. Before such children begin to cry there will be a form of apnea which is not seen in normal children. The children are affected by a simple sudden movement of one leg after the breathing curve has been taken for a short time. Thirty control cases were observed among normal children. Of the spasmophile children tested there were thirteen. The author found that the effect of a simple peripheral disturbance in a spasmophile infant will give a very characteristic respiration curve. At the time of the irritation a cramp of the respiratory muscles takes place, causing pauses in the respiratory curve, and apnea in the period of inspiration or expiration, which sometimes ends in crying and again in normal respiration. According to the duration of the apnea we may judge of the degree of the nervous irritability of the child, and by the shortening or absence of these phenomena we estimate the improvement of the nervous condition. In conjunction with the symptom of Erb, and other spasmophile symptoms, this test gives a positive diagnosis in latent tetany.

Noguchi's Lutein Reaction in Infantile Syphilis.—Germain Blechmann and Maurice Delort (*Ann. de méd. et chir. inf.*, June, 1914) say that the lutein reaction has not been carefully studied in hereditary syphilis. The authors have made a study of this reaction in 100 infants in normal health and fifty affected with hereditary syphilis. In athreptic children the skin is often thickened and if the child is not firmly held the needle cannot be introduced. A cubic centimeter of lutein will make thirty-five intradermo-reactions. The reaction may occur in three different ways: at the end of twenty-four hours we may see an indurated papule which in from three to five days becomes an indurated pustule, this sometimes dries rapidly, at others forms a necrotic crust and leaves pigmentation. Or the reaction may be arrested in the papular stage, and may last but a few days, or exist for a month. The third sort of reaction is characterized by a very long period of incubation, fifteen to twenty days. When the reaction is negative the macule lasts but a few days.

Vulvo-vaginitis of Little Girls Treated by Antigonococcic Vaccine.—J. Comby and Mlle. Condat (*Arch. de méd. des enf.*, June, 1914) state that although the use of antigonococcic vaccine in adults has frequently been reported, few reports of its employment in vulvo-vaginitis have been made. The French method is simple and the form under which the vaccine is furnished is practical. The authors treated sixteen young girls who had vulvo-vaginitis, one of them with peritonitis in addition, a boy with urethritis, and an infant with ophthalmia. They used the vaccine of Nicolle, a mixture of gonococcus

and synococcus in the proportion of 1:9. The synococcus has always been found associated with the gonococcus, by Nicolle and Blaizot, and is very similar to it, differing in its staining affinities and in being less toxic. The gonococcic nature of the vaginitis was confirmed by microscopic examination in all cases. No local treatment was given. Injections were made at first every two or three days; later, more or less frequently according to the indications furnished by the discharge. Amelioration is always immediate and rapid; after one injection the discharge lessens; progress is then slow but regular. Seven or more injections may be required. The fresh cases are better affected than old ones. The results are better than with local treatment and failure has been due to administration of too small doses. This method enables us to do away with vaginal injections, and is simple and harmless.

Streptococcic Peritonitis of Genital Origin.—Henri Schwens (*Arch. de méd. des enf.*, June, 1914) says that most cases of peritonitis in infants are the result of perforation of the gastrointestinal tract, especially of the appendix. Adnexal peritonitis is not rare, having as a cause a vulvo-vaginitis. Generally the infecting organism is the gonococcus, but it may be the pneumococcus, or other diplococcus. Peritonitis is rarely, however, of genital origin in a child. The author describes a case in which the infection was streptococcic and came directly from the genital organs.

Closure of the Ductus Arteriosus after Birth.—Linzenmeier (*Zeitschr. f. Geb. u. Gynäk.*, Bd. lxxvi, Ht. 1) believes that none of the theories proposed for the explanation of the phenomenon are sufficient to satisfactorily account for the sudden exclusion of the ductus arteriosus from the circulation of the child after delivery. It is necessary to assume that several facts are concerned in this question which mutually support and strengthen each other. The principal factor in the closure after labor is the kinking of the tube as the result of a change in the position of the heart which is brought about by the expansion and development of the lungs after the first breath is taken. This is favored by the loose attachment of the duct in the surrounding connective tissue and by the elastic structure of its wall. The musculature of the ductus arteriosus takes part in this process in two directions, first by the contraction of the spiro muscle bundles which strengthens and fixes the kink in this tube and second, by the contraction of the lumen which results from the mass formed by the contracting muscle fibers. Another important factor is the pull on the duct exerted by the branches of the pulmonary artery as the lung suddenly expands.

Congenital Elevation of the Scapula of Familial Type.—H. Neuhoef (*Amer. Jour. Dis. Child.*, 1914, vii, 357) records nineteen cases of this affection, both unilateral and bilateral, all occurring in different members of one family. These show that congenital elevation of the scapula occurs in a familial form. Unilateral and bilateral congenital elevation of the scapula are varieties of one affection. The deformity of the scapula and the defects in the trapezius (as well as other coexisting anomalies) are parts of a more general fault in

development, *i.e.*, Sprengel's deformity is a manifestation of atavism when it prevails in a familial form. It is probably a manifestation of atavism when it occurs in isolated instances.

Treatment of Scoliosis.—A. M. Forbes (*Surg., Gyn. and Obst.*, 1914, xviii, 511) says that the majority of forms of treatment of scoliosis have, while tending to correct the lateral deviation of the spine, tend also to compress the already compressed ribs. It is possible to treat a patient suffering from organic scoliosis without exerting a deforming influence by the production of physiological scoliosis of a converse description to that of the pathological scoliosis already existing. Physiological scoliosis is produced by two means, by side-bending, and by rotation. The writer advocates the rotation treatment. This is best carried out by rotating the patient by means of the arms toward the side of the convexity of the organic (if dorsal) deformity. This may be done while the lower extremities are flexed on an already flexed spine. This attitude is best procured in the recumbent position. Correction having been produced in this manner it must be maintained by the use of a plaster of Paris or celluloid jacket. If maintained for a sufficient length of time and under suitable conditions, the law of Wolff can be depended upon to assure correction of the deformity. This law is that every change in the form and function of the bones, or of their function alone, is followed by certain definite changes in their internal architecture and equally definite secondary alteration of their internal formation in accordance with mathematical laws.

Respiratory Infections in Infants' Wards.—Speaking of the frequency and after fatal results of respiratory infections in infants' wards, W. F. Chappell and A. Brown (*Amer. Jour. Dis. Child.*, 1914, vii, 380) say that it is the pneumococcus and streptococcus infections that cause most of the trouble. None of the measures of respiratory prophylaxis previously proposed have so far met with success. The writers have attempted to prevent respiratory ward infections by (1) increasing the child's individual resistance by careful attention to its nutrition; (2) by careful nursing for the purpose of minimizing the danger of transmitting infection, almost an impossibility where nurse-maids do the greater part of the handling of patients; (3) by the direct prevention of the respiratory infections by postnasal douching with warm antiseptic solutions, chiefly boric acid, followed by argyrol solutions of various strengths. The cleansing of the nasopharynx of all mucus and food-remains, which form a good culture medium for the development of the various organisms, seems very desirable as a preventive measure in these cases. The openings at the tip of the syringe used by the writers are arranged so that the fluid is directed upward, forward and backward, but not laterally, thus minimizing the risk of the entrance of fluid into the Eustachian tubes. The infant is wrapped tightly in a sheet and held in a sitting posture on the lap of a nurse. While depressing the tongue the syringe is carefully introduced behind the soft palate in such a manner that the tip is held free in the postnasal space; the contents are then quickly discharged, the solution pouring out of both nostrils, mingled with curds

and mucus. As soon as the contents of the syringe have been evacuated the nurse quickly throws the infant's head forward, in this manner facilitating the expulsion of mucus, etc. The chief objection urged against postnasal douching is the possibility of the introduction of fluid into the Eustachian tubes; but only four cases of otitis developed in the trial ward, while eleven developed in the corresponding ward where postnasal douching was not done. During the six months of observation the writers used first a 1 per cent. boracic acid solution, followed immediately by a 1 per cent. argyrol solution; more recently, undiluted hydrogen peroxid, followed by a solution composed of three-quarters normal saline and one-quarter Seiler's solution, with results that have appeared better than were obtained with the milder solutions.

Intracranial Hemorrhage in the New-born.—R. M. Green (*Bost. Med. and Surg. Jour.*, 1914, clxx, 682) points out that intracranial hemorrhage may occur in the new-born either from the trauma of operative or normal labor or in association with *hæmorrhagica neonatorum*. It often does not present the typical clinical picture of increased intracranial pressure. Its presumptive diagnosis depends on early recognition of refusal to nurse, pallor, and slight facial edema, which may be confirmed by the appearance of more classic signs. Diagnosis may be positively established, and some therapeutic relief afforded, by lumbar puncture (when the hemorrhage is infratentorial), or by cranial puncture (when it is over the cerebral convexity). If these measures fail to give relief, operative decompression by craniotomy is indicated. The majority of intracranial hemorrhages in the new-born are subdural, but intraventricular hemorrhages may also occur. The source of bleeding may be from laceration of the tentorium, of the choroid plexus, of the longitudinal sinus or of the pial vessels. In cases associated with hemorrhagic disease preliminary transfusion may be indicated before craniotomy. The gravity of the prognosis demands prophylaxis by avoiding all unnecessary occasion for fetal trauma.

Leucocytic Inclusion Bodies.—L. W. Hill (*Bost. Med. and Surg. Jour.*, 1914, clxx, 792) reports upon a series of 100 cases. From these and the studies of others he concludes that the inclusion bodies are present in a majority of cases of scarlet fever up to the tenth day; in nearly all cases before the fourth day. They are not specific for the disease, being found in a number of other infections, most particularly erysipelas, sepsis, pneumonia and tonsillitis. They are more likely to be found in diseases with which the streptococcus is associated. They have the following diagnostic value: If they are not found in a doubtful case which has a rash and a marked fever, the case is probably not one of scarlet fever. They are never found in cases of serum sickness (uncomplicated.) They are probably in the nature of a reaction of injury of the cell nuclei, caused by bacterial toxins and are small fragments broken off from the nuclei.

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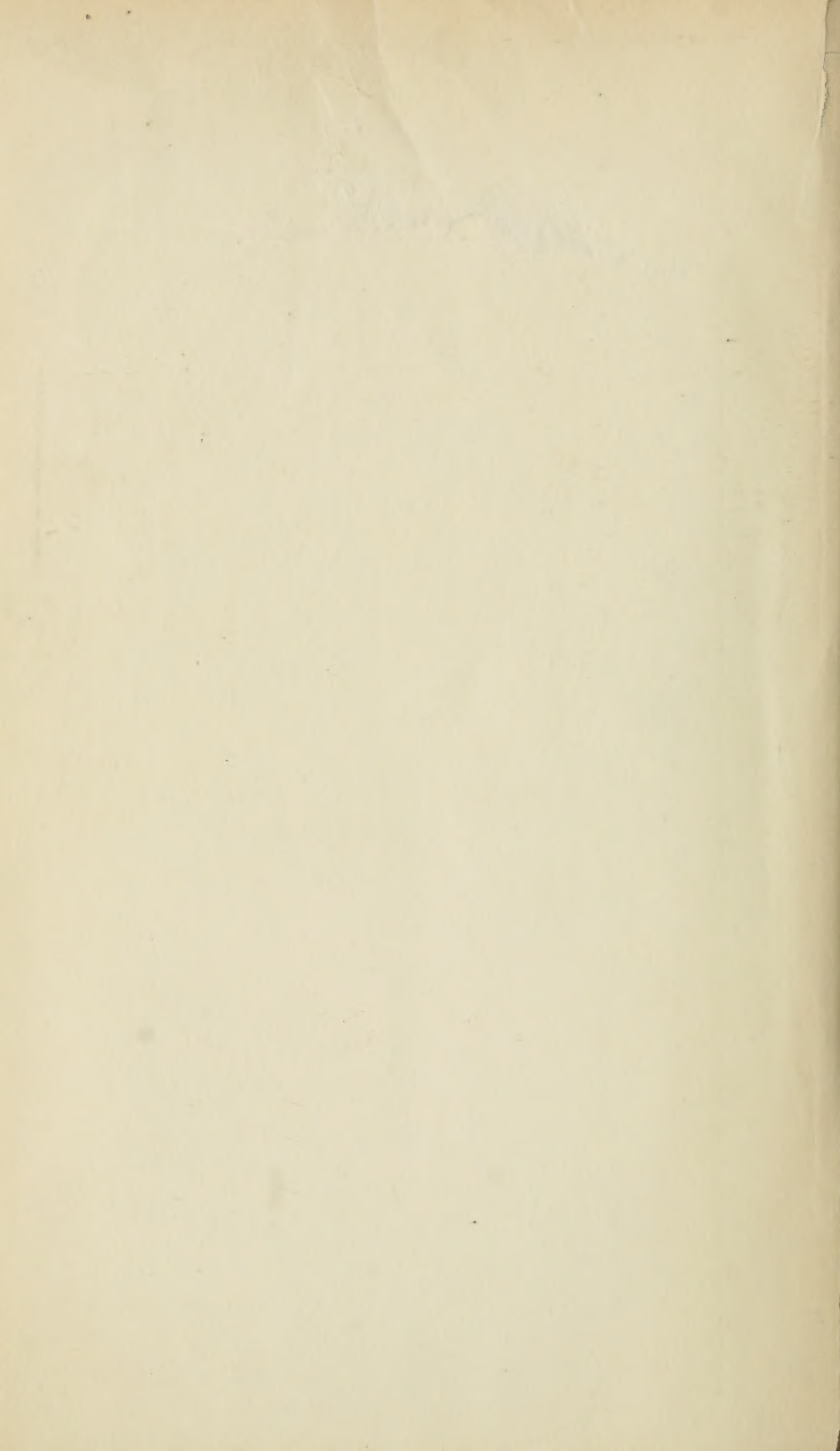
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